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Issued under
the Direction of the
Honorary Managing Committee of the
BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street, London, W.C.1.

Price 2/6 Net.] *Entered as Second Class Matter in the U.S.A. Post.* [Annual Subscription 21/- With Supplement 25/-

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 38.] 1941. [No. 8.

SUMMARY OF RECENT ABSTRACTS.*

VII. HELMINTHIASIS.

General.

FAUST *et al.* (p. 62) have investigated the efficiency of 11 techniques for the demonstration of helminth eggs and protozoa in faeces. The details of these are given, together with the results obtained, and the final recommendation of the authors is that, for clinical laboratory work or in epidemiological surveys, a combination of direct faecal smear with zinc sulphate direct centrifugal floatation is the most useful. The zinc sulphate solution employed is of specific gravity 1,180 and this is used with a 1 in 5 suspension of faeces in saline, which has been sieved through a brass sieve of 40 meshes to the linear inch. In comment LANE points out that a strained suspension is not the equivalent of an unstrained one, that enumeration of organisms should be used in the evaluation of techniques, and criticizes the modified D.C.F. process adopted by the authors. SWARTZWELDER (p. 62) in comparing five methods for the demonstration of intestinal parasites concludes that a centrifugal floatation technique with zinc sulphate solution of specific gravity 1,180 gives the best results for both protozoa and helminth eggs. Lane points out that the technique used was not the standard D.C.F.

SAWITZ *et al.* (p. 62) have compared a direct centrifugal floatation method with the use of the N.I.H. swab for the diagnosis of Enterobius infections, and show that the latter method is much the more sensitive. They state, however, that at least seven swab examinations are necessary before the absence of infection can be regarded as certain.

LANE (p. 477) discusses points raised in a consideration of the work of the New Orleans investigators referred to above. He shows that straining of an emulsion of faeces reduces the hookworm egg count to between 31 and 43 per cent. of the number actually present, and states that the stickiness of the eggs may to some extent account for this loss. In his experience the loss of eggs on straining far outweighs the advantage of a clearer preparation. Furthermore, the

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin*, 1940. Vol. 37. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

American workers repeatedly pour off supernatant fluid after centrifugation and Lane shows that this procedure may result in considerable loss of eggs. The specific gravity of the floating fluid should, for optimum results, vary with the type of egg investigated—for hookworm eggs 1,150 to 1,200 is effective, for Ascaris 1,300 should be used. He also points out that to avoid losing eggs the coverslip to be examined should be removed from the tube by a rapid lift and that the coverslip should not be reversed, but should be examined as a hanging drop. These are some of the points emphasized in the original D.C.F. technique, and the adaptations made by the American workers have probably rendered their technique less efficient than D.C.F. The author points out that a medical man is entitled to expect from a laboratory an estimate of the weight of infection, and he has used D.C.F. for this purpose. He does not consider the American techniques investigated to be as efficient as D.C.F. in this respect.

Nitzulesco *et al.* (p. 65) have compared their modifications of the Willis-Hung and Telemann techniques. They propose to adopt the former in all research on helminth eggs in stools.

Giovannola (p. 479) records the results of a survey in Sardinia; in comment Lane criticizes the technique used. Nitzulesco and Nitzulesco (p. 68) report on the worm infestations found near Jassy, Rumania. Senekji *et al.* (p. 479) have investigated the incidence of intestinal parasites in Irak. de Meillon and Holland (p. 480) record helminthological findings in Zululand. Ascaris infection is the most common and the authors accept the view that air-borne infection is possible. Jadin and Delperdange (p. 480) report on intestinal parasites of men and animals at Coquilhatville, Belgian Congo. Vogel and Riou (p. 67) give a table of the principal helminth infections found during 1937 in the French colonies.

Cram and Folan (p. 480) found a total Enterobius incidence of 12 per cent. in 606 white and negro schoolboys in Washington examined by the anal swab technique, and give the figures of faecal examinations for other worms. Smith *et al.* (p. 478) report on a survey of intestinal parasites in Alabama. Hookworm infection was more prevalent in places with sandy soil than in those with clay. Hoffman and Janer (p. 67) report on a parasite survey of Isabela, Porto Rico.

[In many of these surveys of intestinal parasites the techniques used cannot, on the information given, be regarded as sufficiently sensitive to give an accurate picture of the real incidence of the worms. The surveys therefore lose much of their value for comparison between the various countries and, indeed, for the information desired. It is surely time for the institution of common standards in the various countries if epidemiological work is to have its maximum value.]

In a discussion on anthelmintics, Smillie (p. 68) records his view that the ideal drug has not yet been found, and on account of the deaths which have occurred from the use of oil of chenopodium and of carbon tetrachloride, his advice is to use hexylresorcinol. Smetana (p. 68) describes a condition of nephrosis due to poisoning with carbon tetrachloride. There may be oliguria or anuria, and nitrogen retention may occur. The urine contains albumin, red and white blood cells, casts and bile. In fatal cases there may be central necrosis of the lobules of the liver, and a tendency to bleeding is common.

Hare and Dutta (p. 69) conducted an experiment in which tetrachlorethylene (dose 4 cc.) was compared with a standard oil of chenopodium (dose 30 minims). Assessment of results was made by

the D.C.F. technique, and it was found that the former drug cured 48·3 per cent. of infections while the latter cured only 4·8 per cent. Tetrachlorethylene is pleasant to take, is cheap and has little toxic action.

SWALES (p. 69) has tested the action of phenothiazine in sheep; it is a highly efficient anthelmintic and is comparatively non-toxic. Its efficacy is increased by mixing bicarbonate of soda and tartaric acid into the bolus; the effervescence produced causes fine division and thus aids solution of the drug, which is naturally rather insoluble. The dose used was 0·3 to 1·0 gm. for each pound of body weight.

CHANDLER (pp. 216, 481) discusses local immunity in parasitic infections. In most intestinal helminth infections there are two phases: (1) a reaction to parenteral migration or mucosal burrowing of the larvae before they grow to maturity, and (2) a reaction to the adult parasites in the intestine. Parenteral migration, as in Ascaris and other infections, stimulates a general immunity which is shared by the intestinal mucosa. The type of immune reaction to adult worms is largely influenced by their feeding habits—those which feed on mucosal tissue stimulate local immunity, those which feed on blood are not affected by this type of reaction, but only by a general body immunity. In Trichinella infections there is local intestinal immunity which is highly protective, and, later, parenteral immunity which is relatively feeble but which can be provoked by vaccination. The latter is manifested by eosinophilia and precipitins.

Trematodes.

ALCAY *et al.* (p. 150) report on a focus of *S. haematobium* infection in Algeria. PALLARY (p. 485) attributes the absence of Bulinus and Planorbis, in collections of water south of Biskra, to excess of salts, particularly of magnesium, in those waters.

BARLOW (p. 485) shows that in Egypt the infestation rates of the snails *Planorbis boissyi* and *Bulinus truncatus* closely follow the temperature curve, being highest in the months July to October. The diminished rates during winter are attributed to the Nile flood, the cold season, and the winter closure of water by the Irrigation Department.

MOZLEY (p. 483) states that *S. haematobium* is found throughout Tanganyika and Zanzibar, and *S. mansoni* is widely spread on the mainland but not on the islands. Infection rates vary from 10 to 70 per cent. The intermediate host of *S. haematobium* is probably *Physopsis globosa*, and that of *S. mansoni* is *Biomphalaria pfeifferi*. The undesirable snails are only found in a few of the many ponds, marshes, lakes and streams, and they could in many cases be exterminated at small cost by draining, flushing, poisoning or the use of certain types of vegetation. He found *P. globosa* to be abundant where there was abundant growth of aquatic or semi-aquatic plants, but where the surface of the water was completely covered by plant leaves, the snails were few. The best plant to secure this effect appeared to be *Pistia stratiotes*, but as Lane points out in comment, this is the plant which, at the other side of the Indian Ocean, furnishes air for the larvae of species of Mansonioides, the vector of *Wuchereria malayi*. The author found several local plants to be useful in preparing

effective poisons, but the matter requires further study. He considers that combined measures would bring about the disappearance of the snails within a reasonable period.

VAN DEN BERGHE (p. 482) has investigated schistosomiasis in the Stanleyville province of the Belgian Congo. He considers that *Schistosoma intercalatum* should be regarded as a subspecies of *S. haematobium*. *S. mansoni* infection varies; in Niangara the rate is 5 per cent., according to hospital figures, but in one place near Lake Albert all the children examined showed eggs, while visceral infection with ascites was common. In Faradje, which is densely populated, hepatic cirrhosis with a state recalling that of infection with *S. japonicum* is frequently found. *Planorbis adowensis* is an intermediate host of *S. mansoni* in these regions. DARTEVELDE (p. 150) found *Physopsis africana* in a focus of vesical schistosomiasis in the Belgian Congo, but in a second focus the intermediate host was not found. GIOVANNOLA (pp. 150, 485) states that the snail host of *S. mansoni* in Eritrea is *Planorbis rupelii*, and in Harar *P. adowensis*.

SCOTT (p. 484) has investigated the epidemiology of *S. mansoni* infection in Venezuela. Here schistosomiasis is as severe as anywhere in the world, and in the lower valleys infection rates of 80 per cent. for males and 60 per cent. for females are recorded. The snails concerned are *Australorbis glabratus* and *A. olivaceus* (if the latter is a separate species), and they are usually found in irrigation canals where the current of water is sluggish. Control is possible by drainage and by the careful maintenance and reconstruction of canals, by intermittent use of canals, and by efficient rural sanitation.

By making serial radiographs in Alexandria, MAINZER (p. 485) has shown that in infection with *S. mansoni* there is usually latent pulmonary involvement even in cases in which there are no clinical pulmonary symptoms, and that it comes on about three months after infection. He describes the changes seen, which may consist of focal lesions, increased striation or enlargement of the hilar shadows, and points out that antimony therapy is apparently without effect on the fever of the secondary stage and on the development of the pulmonary changes, if the therapy is started at the onset of the secondary stage and if the usual doses are employed. MAINZER and KRAUSE (p. 487) give an account of the electrocardiographic changes occurring during treatment with tartar emetic. The extent of these changes was parallel to the degree of bradycardia due to the antimony, and indicates the intoxication of the heart muscle caused by the drug, which may not give rise to clinical signs but which may, in exceptional circumstances, result in sudden death through auricular fibrillation.

HOFF and SHABY (p. 147) describe four patients with schistosomiasis; one had myelitis, and all had mental disturbance, but these conditions cleared up on treatment with fouadin or tartar emetic. BAYOUMI (p. 486) reports a case of myelitis in which calcified schistosome eggs were found in the spinal cord and nerve roots, and also in the urinary tract.

PANAYOTATOU (p. 486) reports two cases of urinary schistosomiasis cured with anthiomaline. SCHIAVI (p. 150) reports on treatment of vesical schistosomiasis with stibional and other drugs, including emetine hydrochloride.

SPROULE (p. 148) has investigated the efficacy of chlorination in destroying schistosome cercariae in water, especially in relation to Army water trucks. The chlorination was measured by the Horrocks

test (which is described in a footnote) and the author concludes that for safety the dose of fresh water-sterilizing powder should be that indicated by the Horrocks test plus two when the contact period is half an hour.

BONNE and SANDGROUND (p. 487) found *S. japonicum* infection in 93 of 176 inhabitants of villages on the shore of Lake Lindoe, in Central Celebes. Dysenteric symptoms were absent, enlarged spleens were common but may have been due to malaria. No naturally infected snails were found, but a few specimens of *Oncomelania nosophora* were discovered. BARTSCH (p. 488) claims *Oncomelania yaoi* n. sp. as an intermediate host of *S. japonicum* in the Kiangsi Province, China.

BRACKETT (p. 149) advocates the use of copper carbonate in place of copper sulphate for killing snails in the control of schistosome dermatitis, because it may be used safely by relatively unskilled persons and one application may be sufficient. This is only effective in limited amounts of water; in larger lakes a daily application of solution of formaldehyde may be used, with great care, if there are enough cases of dermatitis to justify the procedure. Otherwise, vigorous wiping after bathing is a useful form of prophylaxis. The cercariae penetrate the human skin largely, if not entirely, when the water is evaporating. He gives a method to estimate the amount of copper carbonate necessary for effective concentration. Copper carbonate is also advocated by the Committee on Water Pollution, Wisconsin (p. 488).

HSU and CHOW (p. 151) describe the development of *Clonorchis sinensis* in laboratory-bred snails. GALLIARD (pp. 152, 489) gives a list of the molluscan hosts of *Clonorchis sinensis* in Tonking and Annam. The most common is *Bithynia chaperi*, and its absence from the higher regions explains their freedom from the infection. The common fish hosts are given, and it is noted that the habit of eating raw fish is an important factor in spreading infection. HSU (p. 152) points out that in *Pseudorasbora parva* experimentally infected with *C. sinensis*, most of the cysts were found about the last few vertebrae, and suggests that this may be the site of election, and worthy of special search in larger fish. MIYANAGA (p. 489) reports on the fish hosts of *C. sinensis* in the Mukden area.

PLOTNIKOV (p. 152) has investigated 191 cases of infection with *Opisthorchis felineus*. There was chronic cholecystitis and cholangitis, leading to cirrhosis of the liver; chronic pancreatitis is common. In blood examinations ZERCHANINOV (p. 152) found anaemia and eosinophilia (to as much as 67·4 per cent.) which reached a maximum on the 25th to 27th day, and thereafter decreased. In the District of Nikopol, Russia, MIRONOVA (p. 153) reports eggs of *Opisthorchis felineus* in 7·5 per cent. of 501 faecal examinations. The propagation of the parasite is attributed to the eating of freshly salted or freshly dried fish.

KINUGASA (p. 490) found infection with *Paragonimus westermanii* in 4·5 per cent. of 5,150 persons of the Sintiku prefecture, Formosa; the rate has fallen in recent years. The consumption of raw or salted crabs is responsible for spread, and these are eaten more by men than by women. KO (p. 153) reports the finding of eggs of *Paragonimus westermanii* in discharge from an abscess of the abdominal wall and in sputum.

SANDGROUND (p. 153) has described the life cycle of *Echinostoma ilocanum*. Near Batavia the early developmental stages take place in the planorbid snail *Anisus* (*G.*) *convexiusculus* Hutt., and cercariae discharged from these encyst as metacercariae in other snails, *Limnaea rubiginosa brevis*, *Viviparus javanicus* and *Pila conica*. Man becomes infected by eating these snails, and it was found that a large proportion of field rats *Rattus rattus brevicaudatus* were infected in nature. The author reports 22 cases of human echinostomiasis in lunatics, but none in their attendants or in the normal population close by; this difference is attributed to the feeding habits of the lunatics, who have been seen eating raw snails. Tetrachlorethylene in doses of 2 to 4·5 cc. appears to be an effective treatment. SANDGROUND and PRAWIROHARDJO (p. 153) have found 190 specimens of adult *Echinostoma ilocanum* in the small intestine of a native who had always lived in Java.

BONNE (p. 490) discusses infection with *Echinostoma ilocanum* in the Dutch East Indies, and gives the names of the common snail hosts. In man the infection leads to diarrhoea and slight abdominal pain, with eosinophilia which subsequently subsides after a large proportion of the worms have been expelled. Infection may persist at least as long as 7 months. A wing-tailed cercaria from *Anisus sarasinorum* in Lake Lindoe is probably a developmental form of the human echinostome of that region. BONNE and SANDGROUND (p. 491) found echinostome infection in from 24 to 96 per cent. of villagers near Lake Lindoe; the infections were heavy and many worms were brought away by tetrachlorethylene treatment. The primary molluscan host is probably a small planorbid snail, though this has not yet been proved. All mussels from the lake close to the heavily infected village were found to be infected, and it is pointed out that these mussels are common articles of diet and are usually insufficiently boiled. No reservoir host could be found.

BRUMPT and LAVIER (p. 151) refer to 89 human infections with *Fasciola hepatica* recorded in the literature. They consider man to be as susceptible as the sheep, and that infection is contracted through eating raw watercress growing in places to which sheep have access. Early symptoms are fever, toxaemia, pain in the liver, and sometimes signs at the base of the right lung. These disappear when the flukes mature and settle in the bile passages, but these passages may become inflamed; eggs are found in the faeces. *Charles Wilcocks.*

[*To be continued.*]

YELLOW FEVER.

PRÉCIS OF ABSTRACTS IN THIS SECTION.

FINDLAY (p. 431) discusses yellow fever in Africa. In the *East African Medical Journal* (p. 432) reference is made to the recent extensive outbreak in the Southern Sudan. The proposals for prevention and control, made at a Conference in Nairobi, are given; these include measures against *Aëdes aegypti*, control of traffic, and vaccination.

SALEUN (p. 432) reports on yellow fever in French Equatorial Africa ; a few cases are recorded, together with several sera positive to the mouse protection test.

DE ASSUMPÇÃO (p. 433) found positive results in over half of a series of people tested for yellow fever immune bodies in the State of São Paulo. Most of these had had or been suspected of jungle yellow fever during the epidemic of 1937–1938.

BUGHER *et al.* (p. 434) have investigated the susceptibility to the yellow fever virus of certain marsupials of Eastern Colombia. The virus was inoculated, but produced no signs of obvious illness in any of the animals tested. Circulating virus was found after a few days, and protective antibodies were formed. In nature the proportion of marsupials showing antibodies was highest in those regions where jungle yellow fever had been most prevalent, and it is concluded that these animals play some rôle in the complex picture of the disease. BUGHER (p. 434) points out that animals which harbour the virus but which are not themselves ill may be more effective in spreading jungle yellow fever than those which become seriously ill and die. He describes in detail his technique for testing the susceptibility of animals to the virus, and points out that the blood of some animals, including the domestic pig and the peccary, shows definite non-specific anti-virus properties. He further (p. 437) finds that mice less than 9 days old show susceptibility to subcutaneous inoculation of yellow fever virus equal to that shown by adult mice to intracerebral inoculation. The incubation periods of both neurotropic and viscerotropic strains are prolonged when they are inoculated into baby mice. Transmission experiments with *Aëdes aegypti* are recorded.

NAPIER (p. 437) discusses the measures taken in India to prevent the introduction of yellow fever. *C. W.*

FINDLAY (G. M.). **The Spread of Yellow Fever.**—*East African Med. Jl.* 1941. Apr. Vol. 18. No. 1. pp. 2–7.

Findlay defines the yellow fever area of Africa, as shown by the mouse protection test. It runs from the west coast at latitude 15°N. along the southern border of the Sahara as far as the Blue Nile. The eastern limit is from the Sudan-Abyssinian border to the western part of Uganda, and the southern border is along the river Congo. It is, however, possible that positive sera may be found in Western Abyssinia, in the foothills of the great plateau. He refers to recent outbreaks in the Nuba mountains and near Stanleyville in the Belgian Congo.

The only mosquito found infected in nature in Africa is *Aëdes aegypti*, but several other African mosquitoes are capable of transmitting the disease by bite in the laboratory. These include *Aëdes simpsoni*, *A. vittatus*, *Taeniorhynchus* (*Mansonioides*) *africanus*, *Eretmopodites chrysogaster*, *Culex thalassius* and *C. fatigans*. "Only in the region of Malakal in the Southern Sudan is there epidemiological evidence to suggest that *Taeniorhynchus* (*Mansonioides*) *africanus* may act as a vector."

The remainder of the paper is largely concerned with the problem of the transporting of infected mosquitoes or men by aeroplanes, motors and trains. *C. W.*

East African Medical Journal. 1941. Jan. Vol. 17. No. 10. pp. 403–408.—**Yellow Fever and East Africa.**

The outbreak of yellow fever in the Nuba Mountains District of the Kordofan Province of Southern Sudan, first noted in October, 1940, affected an area of some 6,000 square miles, and more than 15,000 cases with some 1,600 deaths have been reported. Whilst the epidemic was rapidly dying down by January 1941, the significance of this outbreak for Eastern Africa is very great, for there is now strong evidence that the infection has long been present in the Sudan, and also is probably still present in every region where mouse protection tests have given positive results.

A conference of the various Military Forces in Africa, and of the Yellow Fever Research Institution at Entebbe, was held at Nairobi in December 1940, under the chairmanship of Brigadier A. J. Orenstein, in order to discuss measures of prevention or control to be instituted for the protection of Eastern Central Africa and the East African Coast.

The conference considered that it was of paramount importance that *Aëdes aegypti* should be eliminated from all seaports on the East African Coast which have international or intercolonial trade; all steamships and dhows trading on or to the East African Coast; all inland urban centres and aerodromes; all steamships and dhows plying on Lake Victoria Nyanza and Lake Tanganyika; and all railway premises, also other premises in their neighbourhood and stopping places.

It was considered that not only those travelling by air but all persons, whatever the mode of travel, coming from a region declared to be infected with yellow fever should be in possession of either a certificate of immunity resulting either from vaccination or a previous attack, or a certificate of non-exposure during the preceding six days. The conference also considered it desirable that all pilots and air crews and all those likely to travel by air in Africa should be inoculated against yellow fever.

Attention was called to the difficulty of diagnosing the disease in the absence of an epidemic, and the desirability of obtaining specimens of liver for pathological examination from all persons who have died from short febrile illnesses.

Lastly the conference recommended that all practicable measures of control should be instituted on an adequate scale within the shortest possible time. It is satisfactory to note that the governments of Kenya and Tanganyika, within a few days, had provided a sum of £25,000 for intensification of yellow fever control measures.

E. Hindle.

Lancet. 1941. Apr. 5. pp. 451–453.—**Epidemiology of Yellow Fever.**

Brazzaville: Afrique Equatoriale Française. Rapport sur le Fonctionnement de l'Institut Pasteur de Brazzaville pendant l'Année 1939 [Saleun (G.)]. pp. 56–62.—Fièvre jaune. [**Yellow Fever.**]

Mouse protection tests for yellow fever were carried out on 13 sera collected from natives in the Mouïla district of Gabon, following the discovery of a strongly positive test with the serum of a European;

12 were negative and one doubtful. In July a case of yellow fever occurred at Port-Gentil and the sera of 12 natives in the district were examined with negative results. Finally, 16 sera from natives at Pointe-Noire gave one strongly positive, two medium (1,280 mouse units), and 13 negative.

The serum of a chimpanzee neutralized 640 units, that of a cow also 640 units, and the serum of an ox was negative.

Blood from a case of yellow fever at Fort-Lamy, collected on the fifth day of the disease, the day before the death of the patient, was sent by aeroplane to the laboratory in a thermos flask packed in ice. Six mice were inoculated intracerebrally with this blood and after 13 days developed symptoms of encephalitis. Two passages in mice were obtained, but owing to the shortage of mice it was not possible to preserve this new strain.

During the year the organs of eight Europeans and three natives were examined for their pathological histology. Nine were negative but two, both Europeans, were diagnosed as cases of yellow fever, the diagnosis being confirmed by Dr. Bablet in Paris. Clinical details are given of these two cases.

In the conclusion of the report attention is called to the difficulty of carrying on the work of the laboratory owing to the lack of mice and also to reduced personnel. *E. H.*

de Assumpção (Lucas). Prova de proteção intraperitonial em Camondongo, no estudo epidemiológico da febre amarela silvestre. (Epidemia ocorrida no estado de São Paulo, Brasil, em 1937–1938.) [**Epidemiology of Yellow Fever : Protection Tests in the Camondongo (Brazilian House Rat) in São Paulo.**]—*Bol. Inst. de Hig. de São Paulo.* 1940. No. 71. 25 pp. [18 refs.] English summary.

" 1. The various methods for protection tests such as protection tests in monkeys and intracerebral and intraperitoneal protection tests in mice were studied and commented on.

" 2. The method chosen was that of intraperitoneal inoculation in mice.

" 3. The blood samples examined were nearly all of people who had or were supposed to have had jungle yellow fever during the epidemic which occurred in the State of S. Paulo in 1937–38. They were sent by the State Public Health Department.

" 4. The sera of rhesus monkeys ns. 1, 2 and 3 were negative before the inoculation of virus and positive 4 months after the inoculation of a virus isolated from patients with jungle yellow fever.

" 5. There were made 181 tests, of which 147 were with the various sera to be examined and 34 with control serum.

" 6. Out of 147 protection tests made with the sera to be examined, 79 were positive (53·7 per cent.), 54 were negative (36·7 per cent.) and 6 were inconclusive (4·08 per cent.).

" 7. All the tests made with control sera were conclusive.

" 8. If 34 controls, 6 tests with monkey serum, and 2 tests in vaccinated individuals from different localities in the State of S. Paulo, Brasil, are excluded, there remain still 139 tests. Of these 79 were positive, or 56·8 per cent., and that is the percentage of positive tests obtained with blood of individuals from different localities in the State of S. Paulo, Brasil, where cases of jungle yellow fever were observed during the last epidemic occurring in 1937–1938."

BUGHER (John C.), BOSHELL-MANRIQUE (Jorge), ROCA-GARCIA (Manuel) & GILMORE (Raymond M.). **The Susceptibility to Yellow Fever of the Vertebrates of Eastern Colombia. I. Marsupialia.**—*Amer. Jl. Trop. Med.* 1941. Mar. Vol. 21. No. 2. pp. 309–333. With 1 fig. [10 refs.]

An investigation into the susceptibility to yellow fever of the marsupials occurring in the Villavicencio-Restropo area of Eastern Colombia. Jungle yellow fever was first recognized in this district in 1934, but after 1937 no further cases had been recognized up to the time of this report (July 1940). Six species of marsupials were tested, of which *Didelphys marsupialis*, the black-eared common opossum, was the most abundant, and the results are shown in the table printed on page 435.

Multiplication of the virus produced no obvious signs of illness in any of the species tested. Circulating virus following small inoculation occurred between the fourth and ninth days, persisting for a maximum of 4 days. More of the animals developed protective antibodies than showed circulating virus, but the titre of the protective serum was consistently lower in marsupials than in man or monkeys, in *Didelphys marsupialis* being only 1/50 that of a pool of human immune serum.

Yellow fever antibodies capable of being demonstrated by the protection test are not usually passed from the mother to the offspring either by the placenta, or by the milk, being only found in one doubtful case. Splenectomy produced no striking increase in the susceptibility to infection, in the case of *Didelphys marsupialis*.

Protection tests were carried out on marsupials, mostly *Didelphys marsupialis*, caught in the Villavicencio-Restrepo-Acacias region, during and after the yellow fever outbreak. Out of 48 adults and young adults captured during the epidemic, 16 were positive; whilst after the epidemic and up to 1940, out of 127 adults 21 were positive, but 35 young adults and 81 suckling young were all negative. These results indicate that these marsupials, which with the exception of a few rodents are by far the most numerous animals in the region, must play some rôle in the complex picture of jungle yellow fever in Colombia. Protection tests with wild caught marsupials from various regions are given in tabular form, and reflect the regions of heaviest yellow fever incidence in man two to three years before. In the Rio Negrito region, where 7 out of 21 animals were positive, the incidence of yellow fever was small owing to the scarcity of settlers. Further work is in progress on other possible virus reservoirs and vectors. *E. H.*

BUGHER (John C.). **The Demonstration of Yellow Fever Antibodies in Animal Sera by the Intracerebral Protection Test in Mice.**—*Amer. Jl. Trop. Med.* 1940. Nov. Vol. 20. No. 6. pp. 809–841. With 2 figs. [27 refs.]

A careful study of the technique of the intracerebral protection test in mice and its application in the study of the fauna of Colombia concerning its susceptibility to yellow fever virus.

The Villavicencio laboratory, where this work was carried out, was started in March 1938, and one of its problems was an investigation of

Susceptibility of marsupials to yellow fever virus.

	Genus Species						
	Didelphys marsupialis	*Didelphys paraguay-ensis*	*Philander opossum*	*Metachirus nudi caudatus*	*Caluromys laniger*	*Marmosa* sp.	Total
Virus dose, m.l.d. for mice	100–1,200	10	100–900	100–900	10–500	30	10–900
Number inoculated having negative protection tests	119	19	17	7	3	1	165 ** [166]
Tested for circulating virus	56	16	15*	7	2	1	57 ** [97]
Showing circulating virus	6 (11%)	0	3† (20%)	5 (71%)	2	1	17 (17%)
Surviving for post-inoculation protection tests	94	14	14	4	1	0	127
Showing positive post-inoculation protection tests	19 (20%)	3	3 (21%)	3 (75%)	1	0	29 (23%)

* Of these, 6 were given Asibi strain, 680 m.l.d.

† Two showing circulating virus were inoculated with the Asibi strain. All other inoculations were with the Martinez strain.

[** These figures are given in the original table; they do not correspond with those in the previous columns. Corrected figures are inserted in square brackets.—*Ed.*]

factors which might be of importance in the epidemiology of jungle yellow fever. In this connexion, ambulatory animals in which the virus might circulate in the blood stream, without producing any serious symptoms, would obviously be a more effective source of virus from the standpoint of transmission to other animals or man, than animals seriously ill or dying.

A susceptible animal, therefore, was defined as one in which yellow fever virus would multiply, irrespective of its effect on the host. Since an infected *Aëdes aegypti* inoculates at a single feed approximately 100 infective doses for a rhesus monkey, a proper test dose was considered to be 10 to 1,000 minimum lethal doses (M.L.D.) for mice. The following technique was finally adopted in testing the susceptibility of animals.

A measured volume of the serum to be tested was mixed with an equal volume of virus dilution containing a definite quantity of yellow fever virus. After a definite *in vitro* contact time the mixture was inoculated intracerebrally into a group of adult white mice. These were observed daily for 10 days, deaths after the fourth day being attributed to yellow fever encephalitis in the absence of definite evidence to the contrary. Details are given of the actual technique, and attention is called to sources of variability, among which may be mentioned the strain of mice employed. The main difficulty, however, was in providing a proper dose of virus, which could only be done by the use of virus desiccated with special precautions. The diluent, volume of serum used, contact time and temperature, mode of injection, number of mice used (12), time spent in injection, and the time of day, are all discussed. The controls used comprised virus titration and tests with immune and non-immune serum. A pool of known immune serum is best, but a human immune pool used at the laboratory for nearly two years was found to show a definite decline in the antibody titre. A human non-immune pool prepared from persons thought to be non-immune was found to have antibody activity such that with the virus dose usually employed about half the mice were protected.

The interpretation of the results is next discussed, and the method of establishing a standard is illustrated by giving details of a statistical study of the examination of 216 sera of *Didelphys marsupialis*, considered negative.

It is shown that judgments of antibody content of a serum are best based on a detailed knowledge of the behaviour of known non-antibody containing sera of the same species in a properly balanced and controlled protection test.

The standards of negativity of a large number of species of mammals, some birds, and a few reptiles, of Eastern Colombia are given in tabular form. Out of 10,900 mice inoculated with serum mixtures only 143 survivals are recorded.

It was found that some species of animals showed definite non-specific anti-virus activities. The outstanding examples among mammals were the domestic pig and the peccary, both of which with the usual amounts of virus gave reactions that might be interpreted as weak positives. These animals, however, have been shown to be susceptible to infection with small doses of virus and therefore in mouse protection tests larger amounts of virus should be used.

Another outstanding example of this activity was found in the buzzards, Cathartes and Coragyps, all nine tested showing definite anti-virus properties. *E. H.*

BUGHER (John C.). **The Use of Baby Mice in Yellow Fever Studies.**—*Amer. Jl. Trop. Med.* 1941. Mar. Vol. 21. No. 2. pp. 299–307.

The author has tested the susceptibility of baby Swiss mice to various neurotropic and viscerotropic strains of yellow fever administered subcutaneously and finds that mice less than 9 days old exhibit a high degree of susceptibility, equivalent to that of adult mice of the same strains inoculated intracerebrally.

The incubation period with both kinds of virus is prolonged when they are inoculated into baby mice, in comparison with the same strains inoculated intracerebrally into adult mice. With the former the Asibi strain, in doses of 14 M.L.D., gave an average survival time of 8·7 days; the French neurotropic in doses of 27 M.L.D., 7·6 days; and the Martinez strain, isolated from a non-fatal case of jungle yellow fever in Colombia, in doses 4·8 M.L.D. gave a survival time of 11·2 days. It is evident, therefore, that the marked difference in incubation times, between neurotropic and viscerotropic strains of virus inoculated intracerebrally, are not shown when studied by the subcutaneous route in baby mice.

In insect transmission studies, mice 3 or 4 days old are used, and it is necessary to restrain the activity of the mice to allow the mosquitoes to bite the animals. They may either be fixed to a small block of wood by two narrow strips of adhesive plaster, one transversely over the head and the other over the hind-legs and tail, leaving the back free. Alternatively, the insect is put in a short test tube and the open end of the tube then applied to the back of the mouse and held in position by a strip of adhesive plaster. The mice can be marked by tattooing their tails with india ink using a tuberculin syringe and a fine needle. Each puncture leaves a clean dot, and 6 or 7 such marks can be made along the tail. The results of an experiment in which 10 *Aëdes aegypti* infected with the Martinez strain were placed, one on each of 10 two-day-old mice, are given in tabular form. It is of interest that only 5 mosquitoes became engorged and 3 out of the 5 mice on which they fed became infected, whilst 4 out of the 5 mosquitoes that bit without taking any visible blood also transmitted the infection. The virus content of the five mosquitoes that became engorged was afterwards tested and found to range from 217 to more than 3,000 M.L.D.

E. H.

NAPIER (L. Everard). **Yellow Fever.**—*Indian Med. Gaz.* 1941. Mar. Vol. 76. No. 3. pp. 170–177. With 1 fig., 4 charts & 1 map.

A good general account of the subject with special reference to the importance of yellow fever to India and the rest of Asia.

Details are given of the quarantine regulations that are now enforced at Karachi on all passengers arriving by aeroplane from Africa, and no aeroplane is allowed to come to Karachi from any endemic area unless it has passed through either Khartoum or Cairo, where there are anti-amaryl aerodromes. Further precautions include spraying of the inside of the aeroplane if the disinsectization certificate is not in order, or if there is on board any passenger who does not hold a certificate indicating that it was at least 9 days since he was in an endemic area. In addition any such passenger is detained until the

expiration of this period, in a special mosquito-proof ward to which he is taken in a mosquito-proof ambulance. No person is allowed to enter India by air except at Karachi, where these facilities exist, and under no circumstances whatever is yellow fever virus allowed to be imported, even by laboratory workers. *E. H.*

THE TYPHUS GROUP AND OTHER FEVERS.

Précis of Abstracts in this Section.

Louse- and flea-borne typhus.—In the *Lancet* (p. 440) is an annotation which refers to a recent outbreak of typhus, presumably louse-borne, in Madrid and other parts of Spain. The Cox method of preparing vaccine is mentioned.

Discussing atypical typhus, Morozkin (p. 440) states that in Russia cases in which the fever lasts only 9 days are no more than 2·1 per cent. of the whole. In children the rash may be indistinct and there may be a tendency towards remission, but even in atypical cases there are usually enough indications of the nature of the disease for a correct diagnosis to be made. Gromaschewski and Morozkin (p. 441) in Russia find no support for the view that typhus is less severe in summer than in winter.

Haralson (p. 441) states that in the Territory of Hawaii the incidence of typhus was greater in 1940 than in 1939; 77 cases were reported in 1940.

Monnier (p. 441) describes the pulmonary lesions in experimental typhus.

Dowds (p. 442) reports an outbreak of mild typhus, without visible rash, in native labourers on a copper mine in N. Rhodesia. *Proteus OX19* was agglutinated in high dilution and scrotal lesions were produced in guineapigs on injection of blood from the patients. Many rats were seen in the men's huts. Bhatia (p. 442) describes a case of presumably flea-borne typhus in a resident of Lucknow; there were no other cases in the neighbourhood. Asano (p. 442) reports on 86 cases of typhus, presumably murine, in Okayama. Only two were fatal; the Weil-Felix reaction was positive in all by the fourth week. Curbelo *et al.* (p. 442) have found a murine virus in a rat in Pinar del Rio; the human disease there is regarded as of murine origin. Nauck and Zumpt (p. 443) confirm previous findings by other workers in concluding that the bed bug is of no importance in the transmission of murine typhus.

Tick- and mite-borne typhus.—de Magalhães and Moreira (p. 443) describe an exceedingly acute form of typhus which occurs in Minas Geraes. Death may be so sudden that the suspicion of foul play is raised. They discuss the actual cause of death. de Magalhães (p. 444) reports inapparent typhus in a woman and in a dog in Bello Horizonte. In both cases the blood was infective to guineapigs and the Weil-Felix reaction positive as a group reaction; both the woman and dog were in good health. With Penna (p. 444) this author gives

details of a series of electrocardiographic examinations of typhus patients. He also (p. 444) gives a list of animal reservoir hosts in Minas Geraes.

GUNTHER (p. 445) has investigated mite-borne typhus in New Guinea, where the disease is almost confined to white men working in virgin bush; no cases have been seen in natives. The vector is probably *Trombicula minor* and the animal reservoir is the bandicoot.

HEASLIP (p. 445) discusses tsutsugamushi in Queensland, the chief diagnostic signs of which are primary sore, rash, and positive Weil-Felix reaction to *Proteus OXK*. *Trombicula deliensis* is found on rodents in the neighbourhood, and is the probable vector.

Q fever, etc.—BENGTSON (p. 446) has shown, by agglutination and absorption tests, that the organisms of Australian and American Q fever are to be regarded as the same. Though there is some difference in virulence, this is no more than may be observed between different strains of Rocky Mountain fever viruses. LILLIE *et al.* (p. 446) describe the pathological appearances found in a patient who had died of pneumonitis in an institution. These were essentially the same as those found in monkeys inoculated into the lung with strains of the virus of Q fever, but Rickettsiae were not seen in either the human or the animal tissues. DERRICK *et al.* (p. 447) have shown that, beside the bandicoot, seven rodents and two marsupials are susceptible to the virus of Q fever.

WEBB (p. 447) records the finding of Rickettsia-like bodies in *Triatoma rubrofasciata* in Mauritius. They were present in all organs examined and are apparently transmitted hereditarily to the embryos; the bodies produced lesions in laboratory animals.

Agglutination tests.—For agglutination tests, HUDSON (p. 448) has made use of emulsions of Rickettsiae from lungs of infected rats and mice. With immune sera the Rickettsiae were clumped and clear-cut results obtained.

CASTAÑEDA *et al.* (p. 448) describe a rapid method of performing the Weil-Felix reaction; this can be carried out at the bedside, and if the result is strongly positive it occurs almost instantaneously. LEVIN (p. 449) found some relationship in the Weil-Felix reaction between the agglutination and the globulin content of the immune sera. DWYER and ATKINSON (p. 449) report tests on sera from persons not suffering from typhus, in S. Australia. Several gave positive results with the H type of a local strain of Proteus.

ESSEVELD and KOUWENAAR (p. 449) have investigated a number of strains of *Proteus X* from human sources. Some of these are as suitable for diagnostic purposes as the standard strain *Proteus XK*, but others are only partially effective. The same applies to the *Proteus X19* strains. None of the strains obtained from guineapigs corresponded to standard *Proteus X*.

Vaccination.—GEAR (p. 450) describes the production of typhus vaccine by growing the Rickettsiae in the chick embryo, and states that by this method sufficient quantities for large scale production of vaccine could be supplied. TCHANG and MATHEWS (p. 450) describes the preparation of vaccine of *Rickettsia prowazeki* by the inoculation of eggs with infective material and incubation for 5 days. The vaccine is standardized by comparison with the numbers of Rickettsiae found in infected intestines of lice, and gives solid immunity in guineapigs. It has been used in man. KUROTCHKIN and WYCKOFF (p. 451) find that vaccine of the Rocky Mountain

fever organism prepared by cultivation in fowl embryo has about the same immunizing power as that prepared by cultivation on agar slopes, but that the former method is easier to carry out and is less costly. The same findings apply also to vaccines against epidemic typhus.

Other fevers.—HEASLIP (p. 451) has investigated the "coastal fever" of Queensland and its differentiation from scrub typhus. Mice inoculated with the blood of patients suffering from coastal fever only do not die, but when examined are found to be infected with a pleomorphic organism, probably of the anthrax group, which, though it grows readily on media at temperatures between 20° and 30°C., will not grow at 37°C. Mice infected with the coastal fever organism remain susceptible to scrub typhus, and the sera of persons recovered from coastal fever do not contain agglutinins for *Proteus OXK*, but the two diseases quite commonly occur together, and the pleomorphic bacilli may be recovered from sera the clots of which give rise to typhus when inoculated into animals. The coastal fever bacillus was found in 70 per cent. of rats and bandicoots examined in the localized area in which the disease occurs, and the author considers that the disease may be transmitted by a mite, a mosquito or a tick. The symptoms of coastal fever include adenitis and sore throat.

WEINMAN (p. 453) shows that in S. America bartonellosis is now a major health problem, and that in Colombia it has recently reached epidemic proportions. The parasite of this disease may be found in the blood of convalescent or of healthy carriers. It is suspected that transmission may be effected by lice or ticks; sandflies are apparently not incriminated in Colombia. RAY and IDNANI (p. 453) refer to bartonellosis in dogs in India. JIMINEZ and BUDDINGH (p. 453) show that *Bartonella bacilliformis* is readily cultivated within the allantoic fluid of the developing chick embryo, at room temperature, and that it will also grow in that fluid *in vitro*.

ANDERSON *et al.* (p. 454) report on investigations on sandfly fever in India. *C. W.*

LANCET. 1941. Apr. 26. 548.—**Control of Typhus.**

This note is recorded here because it contains a reference to the recent outbreak of typhus in Madrid in which it is reported that some 300 cases have been discovered and that 20–30 cases were being diagnosed daily. The disease is said to have broken out also in Murcia, Granada, Seville and Almeria. Vigorous action on the usual lines for louse-borne typhus has been taken, and the annotation in the *Lancet* refers to the possibility that vaccine prepared according to the method of Cox, by inoculating the yolk sac of the developing fowl embryo, may prove to be a valuable aid in prevention in such outbreaks. [See this *Bulletin*, 1939, Vol. 36, p. 984; 1940, Vol. 37, pp. 268, 562, 580.] *C. W.*

MOROZKIN (N. I.). **The So-called "Atypical" and "Abortive" Forms of Typhus.**—*Jl. Microbiol., Epidémiol. et Immunobiol.* Moscow. 1940. No. 8. [In Russian pp. 44–51. With 4 charts. [26 refs.] English summary p. 52.]

"Great epidemiologic interest presents the disputable question whether or not there exist 'atypical' and 'abortive' forms of typhus.

" The indistinct appearance of one of the symptoms of typhus—the rash, of the general reaction (typhus condition) and of the fever reaction, is more often observed among children.

" Employing the method of thermometry at the typhus nidus, the author definitely established the limits of the ' abortiveness ' of typhus which has been reduced to a 9-days-fever. However, the nine-day course of the fever has been observed in 2·1 per cent. of the cases only.

" The stability of the fever-reaction in typhus can be explained by the specific peculiarities of the causative virus. Fallacious conclusions as to the shortened course of the disease may be drawn by non-consideration of the first days of the disease.

" The propensity to remissions is one of the signs of ' atypicity ' of typhus in children.

" There have been sufficient symptoms for a correct diagnosis to be made in the series of ' atypical ' cases presented by the author, selected from 1,133 cases of typhus under his observation."

GROMASCHEWSKI (L.) & MOROZKIN (N.). Sommer-Flecktyphus. [**Summer Typhus.**]—*Jl. Microbiol., Epidémiol. et Immunobiol.* Moscow. 1940. No. 8. [In Russian pp. 52–55. German summary.]

The authors have found that there is no essential difference between typhus which occurs in summer and in winter. The febrile period is the same (14·9 and 14·4 days respectively), the complications are the same and the mortality rates equal (5·2 and 5·0 per cent. respectively). They therefore reject the theory held by many workers that the virulence of the disease is less in summer than in winter. In summer as in winter, patients with the disease are equally dangerous as potential sources of spread. *C. W.*

HAWAII, TERRITORY OF: BOARD OF HEALTH. REPORT FOR FISCAL YEAR 1940 [HARALSON (M. F.)]. p. 95.—[**Typhus Fever.**]

" Typhus fever increased markedly, cases being reported from all islands except Lanai. This disease also set a record for cases occurring during the year on Hawaii, Oahu and Kauai as well as the Territory. Seventy-seven cases and one death were reported for the year as compared with 57 cases and one death in 1939."

MONNIER (A.). Lesión tifosa experimental en pulmón de animales de laboratorio. [**Pulmonary Lesions in Experimental Typhus.**]—*Medicina.* Mexico. 1940. Nov. 10. Vol. 20. No. 375. pp. 548–550.

In animals infected by the intranasal route there is peribronchial pneumonia, with large numbers of Rickettsiae ; in infection by other routes the lesions are similar but less intense. In man there is oedema and passive congestion, diapedesis of leucocytes and peribronchial pneumonia ; there is blood pigment in the macrophage cells but Rickettsiae are not found. *C. W.*

DOWDS (J. H.). **A Preliminary Report on a Series of Cases of Murine Type Typhus in Northern Rhodesia.**—*South African Med. Jl.* 1941. Jan. 25. Vol. 15. No. 2. pp. 30–32.

A number of mild cases of typhus have been met with among the natives living in the compound of the copper mines. The cases were clinically typical of typhus except for the fact that in no case could any rash be detected. The Weil-Felix reaction was positive for *Proteus OX19* in all cases up to 1/6,400 and *Proteus OX2* was also agglutinated; in one case the titre was 1/1,600 for *OX2* and 1/800 for *OX19*, but in the remainder of the cases *OX2* was only agglutinated in low dilutions. Cultures of blood, urine and faeces were made in all cases but without result. Injection of blood from six of the patients caused pyrexia, scrotal lesions and death in six guineapigs. There was no history of tick bite in any of the cases and none had been away from the station for over a month. Many rats were seen in the men's huts. *D. Harvey.*

BHATIA (B. B.). **Sporadic Typhus.**—*Jl. Indian Med. Assoc.* 1940. Oct. Vol. 10. No. 1. pp. 30–32.

A moderately severe case of typhus fever with a maculo-papular rash, delirium and a positive Weil-Felix reaction for *Proteus OX19* is described. The patient had been resident in the City of Lucknow for several years and had not been away for many months. There were no other cases in his household or the neighbourhood, the author therefore concludes that this was a case of sporadic urban typhus probably carried by rats and rat fleas. *D. H.*

ASANO (Shizuo). Statistische Beobachtungen ueber das Fleckfieber in der Gegend von Okayama. [**Statistical Observations on Typhus Fever in the Neighbourhood of Okayama.**]—*Okayama-Igakkai-Zasshi* (*Mitt. d. Med. Gesellsch. z. Okayama*). 1941. Jan. Vol. 53. No. 1. [In Japanese pp. 104–116. With 4 charts. [58 refs.] German summary pp. 116–117.]

During the last few years 86 cases were observed. These cases were most common in the period May to December in each year. Duration of the fever was from 6 to 23 days and the average was 14 days. A rash was observed in 93 per cent. of the cases and this rash appeared from the third to the sixth day. The Weil-Felix [presumably with *Proteus OX19*] reaction was positive in 46 per cent. of the cases by the end of the first week of the fever, in 79 per cent. during the second week, in 94 per cent. during the third week and in 100 per cent. during the fourth. Only two cases were fatal.

[This is presumably flea-borne murine typhus, though no statement to that effect is given in the German summary, nor is the type of Proteus used in the Weil-Felix reaction mentioned.] *D. H.*

CURBELO (Arturo), VELA (Enrique Marrero) & MORENO (Abelardo). Comprobación de un virus murino en los estudios del tifus pinareño. [**Identification of a Murine Virus in the Study of the Typhus of Pinar del Rio.**]—*Vida Nueva.* 1941. Feb. Vol. 47. No. 2. pp. 53–62. With 9 figs.

The authors examined a rat (*R. norvegicus*) from Guanajay in the Province of Pinar del Rio. Injection of its blood into guineapigs

produced, in one of these animals, lesions typical of those found with the virus of murine typhus, with scrotal reaction in which Rickettsiae were plentiful. The blood of the rat, however, failed to give the Weil-Felix reaction. Fleas from the rat were ground up and injected into guineapigs, but without result. The authors regard the typhus of Pinar del Rio as of the murine type [see this *Bulletin*, 1941, Vol. 38, p. 203]. *C. W.*

PHILIP (Cornelius B.). **Rocky Mountain Spotted Fever.**—*Bull. Med. Library Assoc.* 1940. Dec. Vol. 29. No. 2. pp. 86–92. With 4 charts. [19 refs.]

A paper read at the annual meeting of the Medical Library Association and illustrated by slides and moving pictures and references to the literature. *D. H.*

NAUCK (E. G.) & ZUMPT (F.). Versuche zur Uebertragung der murinen Fleckfiebers durch die Bettwanze. [**The Question of the Transmission of Murine Typhus by the Bed Bug.**]—*Zent. f. Bakt.* I. Abt. Orig. 1940. Aug. 15. Vol. 146. No. 3. pp. 97–103.

Although *Rickettsia mooseri* remains virulent in *Cimex lectularius* for as long as 20 days after intracoelomic injection, experiments on transmission from mouse to mouse by the bites of these bugs were negative, and the crushing of infected bugs on the skin also failed to cause infection. These results confirm those obtained by CASTAÑEDA and ZINSSER [this *Bulletin*, 1931, Vol. 28, p. 96] which indicated that *C. lectularius* was of no importance in the transmission of murine typhus. *C. W.*

DE MAGALHÃES (Octavio) & MOREIRA (João Affonso). Typho exanthematico em Minas Geraes. Aspectos clinicos. [**Typhus in Minas Geraes: Clinical Aspects.**]—*Brasil-Medico.* 1940. Apr. 6 & 13. Vol. 54. Nos. 14 & 15. pp. 252–260; 272–278.

The authors describe a condition which they name *typhus siderans*. In this extremely acute form the onset is sudden, without prodromata or exanthemata, and death takes place in two or three days. There is high fever, delirium, and intense headache. Death may occur suddenly, in apparently robust patients, and they have been known to die in the street so quickly that the suspicion of crime has been raised. Post mortem examination, aided by animal inoculation, has proved such cases to be due to typhus. The cause of this sudden death cannot be attributed to myocarditis, and the authors suspect that it may be due to azotaemia, acidosis, the action of the virus on the nerve centres or the heart, or to nephritis.

The authors discuss the diagnosis and prognosis of typhus in Minas Geraes, and give a list of drugs which have been used in treatment but which have had little effect. Very full details of 9 cases are given. *C. W.*

i. DE MAGALHÃES (Octavio). Typho exanthematico em Minas Geraes. Molestia humana inapparente—cão naturalmente infectado. Nota prévia. [**Typhus in Minas Geraes: Inapparent Human Infection: Natural Infection in a Dog.**]—*Brasil-Medico.* 1940. July 27. Vol. 54. No. 30. pp. 503–504.

ii. —— & PENNA (Renato). Typho exanthematico do Brasil, em Minas Geraes. Estudos electrocardiographicos. [**Electrocardiograph Studies.**]—*Ibid.* Aug. 3, 10, 17, 24, 31 & Sept. 7. Vol. 54. Nos. 31, 32, 33, 34, 35 & 36. pp. 519–526; 541–544; 558–560; 578–581; 592–596; 606–608. With 30 figs. English summary.

i. A patient with severe typhus was admitted to, and died in, hospital at Bello Horizonte. Two days later his wife was examined, and though she was apparently healthy, with normal temperature and pulse, injection of her blood produced typical typhus lesions, with fever, in a guineapig, and from this animal others in series were infected with the same results. In one of the guineapigs the scrotal reaction was present. The blood of this woman gave the Weil-Felix reaction to a titre of 1/80 with *Proteus OX19*, and to a titre of 1/40 with *Proteus OX2*; this was regarded as a group reaction. After an interval of 37 days her blood failed to infect a guineapig and the Weil-Felix reaction was reduced to 1/20 with *Proteus OX19*. She is therefore regarded as a case of inapparent infection.

In the same house there was an apparently healthy dog; blood from this animal produced typhus lesions, with scrotal reaction, on injection into a guineapig, and the infection was carried in series in other animals. After 26 days, and 40 days after the death of the first patient, the blood of the dog was still infective, and gave a reaction to *Proteus OXK* in dilution 1/320. The animal was then lost sight of.

ii. In this series of papers the authors give minute details of the examinations made of 11 patients. The electrocardiographic findings are recorded in an English summary :—

"The present work was based on 14 electric tracings of the heart of 11 patients the examination of whom was detailed and, as far as possible, complete. They were all serious cases of exanthematic typhus met with in Minas Geraes. It was found possible to make an autopsy of the majority of these cases, 4 dating from 1937, 4 from 1938 and 3 in 1939.

"In all the tracings the A.A. verified a sinusal tachycardia and clear electrocardiographic signs of myocardiac hypotonia.

"In the majority they found: myocardiac hyper-excitability and functional deficiency of His's bundle. In some of the tracings there was a deviation, or a tendency to deviate, either to the right or to the left. In one case they noticed the appearance of an extra-systolic manifestation, without compensation or posterior rest, the interpretation of which was not perfectly established.

"No signs were found of organic lesions of the differentiated conductor system or of extensive lesions of the myocardium, this agreeing with the anatomical and pathological findings on the macroscopic and microscopic examination which showed focal myocarditis."

C. W.

DE MAGALHÃES (Octavio). Typho exanthematico em Minas Geraes. Nota prévia. [**Typhus in Minas Geraes. Preliminary Note.**]—*Brasil-Medico.* 1940. June 8. Vol. 54. No. 23. p. 393.

It has been proved that certain animals may act in nature as the reservoir of the typhus of Minas Geraes, and the author mentions the

following :—the dog, the preá and the gambá (species of opossum ; *Cavia aperea* and *Didelphys marsupialis*), the fox (*Canis brasiliensis*), the cotia (a rabbit-like rodent *Dasyprocta azarae*) and the bush rabbit (*Silvilagus minensis*). He now shows that the wild cat (*Felis wiedi*) though not very susceptible to the disease, can be infected experimentally, and may therefore be a reservoir in nature. *C. W.*

GUNTHER (Carl E. M.). **A Survey of Endemic Typhus in New Guinea.**—*Med. Jl. Australia.* 1940. Nov. 30. 27th Year. Vol. 2. No. 22. pp. 564–573. [58 refs.]

Clinically these cases show a primary eschar with local lymphadenitis, sustained moderate fever, low pulse rate, severe toxaemia, enlargement of the spleen and typical rash and therefore resemble Japanese River fever. The disease is practically confined to adult white males who are employed in clearing areas of virgin bush or who are otherwise occupied in newly cleared areas.

A full clinical description of the disease is given with detailed instruction in the methods employed in carrying out the agglutination tests. *Proteus OXK* is agglutinated and the following deductions are drawn from the results:

In a mild case in which the agglutination is not higher than 1/80 prognosis is good ; in severe cases in which the agglutination reaches a titre of 1/320 or higher prognosis is also good, but in severe cases, if the titre does not rise above 1/80, prognosis is bad especially in elderly alcoholic individuals. So far the author has been unable to detect any cases of the disease in the natives of the country. A very careful survey of the various species of mites and their animal hosts has been made by the author and he concludes that the vector of the disease is *Trombicula minor* and the animal reservoir is the bandicoot. *D. H.*

HEASLIP (W. G.). **Tsutsugamushi Fever in North Queensland, Australia.**—*Med. Jl. Australia.* 1941. Mar. 29. 28th Year. Vol. 1. No. 13. pp. 380–392. [41 refs.]

A typhus-like fever similar to Japanese river fever has been reported in Queensland so long ago as 1913, and in 1927 a series of cases was described. The chief diagnostic symptoms in these cases were a primary sore, a rash and a positive Weil-Felix reaction with *Proteus OXK*. In the present paper 54 cases were investigated and full details of the cases are given in tabular form, only one of the cases was fatal. Many cases in the present series showed a blood infection with the bacillus described by the author in an earlier paper [see below, p. 451]. As regards diagnosis of the cases this is simple if the true primary sore is detected, but in the present series this was noted only in 17 out of 48 cases ; a rash was observed in 29 of the cases, but in this investigation the best diagnostic aid was the inoculation of the blood of fever cases into mice ; in positive cases the animals died in about 10 days and showed pleural and peritoneal effusion and enlarged spleen. In practically all the cases in which it was possible to make repeated examinations of the sera of the patients there was a definite evidence of the rise and fall of the agglutination titre for *Proteus OXK*. A laboratory assistant, whose duties included the inoculation of mice with the blood of the fever cases and the

subsequent examination of these animals, contracted the disease, he had 11 days of fever, a rash appeared on the 5th day and a sore was noted on his finger, with lymphangitis extending up to the elbow. Mice were inoculated with his blood and those inoculated during the febrile period became infected and died with the typical post mortem appearances ; also his blood serum agglutinated *Proteus OXK* in high dilutions. Guineapigs, rats, rabbits and monkeys were also shown to be susceptible to the virus, and rats and bandicoots caught in the scrub and swampy areas, where all the patients had contracted the disease, were shown, by means of the mouse test, to be naturally infected. As regards the vector 90 per cent. of the larval mites caught on wild rats and bandicoots were found to be *Trombicula deliensis*, and it is therefore probable that this mite is the vector here as elsewhere.

D. H.

Bengtson (Ida A.). **Immunological Relationships between the Rickettsiae of Australian and American "Q" Fever.**—*Public Health Rep.* 1941. Feb. 14. Vol. 56. No. 7. pp. 272–281. [11 refs.]

Agglutination and absorption tests were carried out with the two viruses. Emulsions of these organisms were prepared from the livers and spleens of infected mice ; in the course of this work it was noted, as had already been reported in Australia and America, that the X (American) virus is distinctly more virulent than the Q (Australian) virus, yet it is pointed out that in this respect the two viruses do not differ more than do different strains of Rocky Mountain fever virus. Suspensions of Rickettsiae were prepared by centrifuging and suspending the precipitates. Immune sera were prepared by inoculation of rabbits with purified emulsions of Rickettsiae killed by addition of 1/10,000 merthiolate. Human sera obtained from Australia were also used in these tests and the results showed a close relationship between the two Rickettsiae, there being practically no difference in the results obtained. Absorption tests were also carried out and the results of these tests gave further evidence of the identity of the two organisms ; precipitin tests also confirmed this opinion.

In view of the practical identity of the results in the serological tests and of results already obtained in cross immunity and cross protection tests in animals it would appear justifiable to consider the Australian and the American types as one and the same. *D. H.*

Lillie (R. D.), Perrin (T. L.) & Armstrong (Charles). **An Institutional Outbreak of Pneumonitis. III. Histopathology in Man and Rhesus Monkeys in the Pneumonitis due to the Virus of "Q" Fever.**—*Public Health Rep.* 1941. Jan. 24. Vol. 56. No. 4. pp. 149–155. With 6 figs. on 2 plates. [Summary appears also in *Bulletin of Hygiene.*]

Parts I and II of this investigation, the first dealing with epidemiological and clinical studies, the second with the isolation and identification of the causative agent, have unfortunately not reached the Bureau. They were published towards the end of 1940 and have probably met the fate of much else that is good at the hands of the enemy.

The present study, the third in the series, details the pathological findings of a fatal human case reported in the first paper and compares these with the lesions following intrapulmonary inoculation of *Macaca mulatta* with strains of the " Q " fever virus.

The patient was a white man, aged 59 years ; his illness started as " a cold " on 17th April, 1940. On admission to hospital 5 days later his temperature ranged between 102° and 103·5°F. There was dullness over the lower lobe of the right lung posteriorly and a smaller area over the left lung. He died three days later. Macroscopically, autopsy revealed congestion and oedema of left lung, more of lower lobe ; firm, grey granular consolidation of right upper lobe posteriorly. Microscopically, diffuse consolidation with compact fibrino-cellular exudate ; interalveolar septa show accumulated lymphoid, plasma and large mononuclear cells and a varying degree of fibrin. Small patchy peribronchial pneumonic areas were also seen.

" Bronchi in the latter areas contain purulent exudate, their epithelium has desquamated, and polymorphonuclears in moderate numbers infiltrate their walls which are focally necrotic. The pneumonic exudate consists of fibrin and variable proportions of polymorphonuclears, macrophages, and red blood cells. Gram-positive and gram-negative cocci are fairly numerous, and are chiefly intracellular. Peribronchial, perivascular, and pleural fibrosis is of moderate degree, and there is focal lymphocyte and plasma cell infiltration in these areas."

The lesions produced in eight monkeys inoculated into the right lung with four strains of " Q " fever virus were essentially the same as the above. Rickettsiae were not seen in either the human or animal material. The pathological changes in other organs are mentioned but show nothing of special import. *H. H. S.*

Derrick (E. H.), Smith (D. J. W.) & Brown (H. E.). **Studies in the Epidemiology of Q Fever. 6. The Susceptibility of Various Animals.**—*Australian Jl. Experim. Biol. & Med. Sci.* 1940. Dec. Vol. 18. Pt. 4. pp. 409–413. With 1 fig. [Summary appears also in *Bulletin of Hygiene.*]

The authors have carried out an experimental investigation the results of which indicate that *R. burneti*, the cause of Q fever, has a wide range of potential hosts, and that the reservoir hosts may include several beside the bandicoot (*Isoodon torosus*). Nine other species of bush animals were tested for susceptibility—recovery in the guinea-pig of Q virus from an intraperitoneally inoculated animal, was accepted as demonstrating susceptibility—seven rodents and two marsupials and all were found susceptible, though the infection was mild in all and in some inapparent. The rodents were : *Rattus assimilis*, *R. conatus*, *R. culmorum*, *R. lutreolus*, *Hydromys chrysogaster*, *Melomys littoralis* and *Thetomys gracilicaudatus* ; the two marsupials were : *Trichosurus vulpecula* and *Aepyprymnus rufescens*. [Previous references are given in this *Bulletin*, 1941, Vol. 38, p. 208.] *H. H. S.*

Webb (J. Lewis). **The Occurrence of Rickettsia-like Bodies in the Reduviid Bug *Triatoma rubrofasciata* and their Transmission to Laboratory Animals.**—*Parasitology.* 1940. Nov. Vol. 32. No. 4. pp. 355–360. With 1 fig.

The experimental work recorded in this paper was carried out in Mauritius. Ten bugs were examined, smear preparations were

made from seven and three were sectioned; in all Rickettsia-like bodies were readily demonstrated in stained smears from every organ of the body examined. Coccoid bodies and lanceolate forms were noted and also rod-shaped organisms, which were the predominating type and which were found intracellularly and also intranuclearly. These Rickettsia bodies are transmitted hereditarily and were found in the unhatched embryo and in larvae of the bug.

These organisms produced pathological lesions in laboratory animals and could be maintained for at least five passages in guineapigs.

D. H.

HUDSON (N. Paul). **A Macroscopic Agglutination Test with Typhus Rickettsiae prepared from Infected Rodent Lungs.**—*Jl. Infect. Dis.* 1940. Nov.–Dec. Vol. 67. No. 3. pp. 227–231.

The emulsions of Rickettsiae for these tests were obtained from the infected lungs of rats and mice. These were tested against immune and normal sera in small tubes; the tubes were placed in a water bath at 40°C. for 3 hours, the results were then read and the tubes held in the cold overnight and again read. Clear-cut results were obtained with immune sera. Cases of typhus tested gave positive results, complete clumping, in dilutions ranging from 1/320 and 1/128,000. All controls were negative. *D. H.*

CASTAÑEDA (M. Ruiz), SILVA (Roberto) & MONNIER (Alberto). Diagnóstico específico y no específico del tifo exantemático. [**Specific and Non-Specific Diagnosis of Typhus.**]—*Medicina.* Mexico. 1940. Oct. 10. Vol. 20. No. 373. pp. 509–513. With 1 fig. English summary (5 lines).

The authors prepare the antigen from *Proteus OX19* as follows:—The bacilli are suspended in physiological saline containing 10 per cent. formalin, and this emulsion is maintained at room temperature for 72 hours. It is then filtered through cotton and the filtrate is centrifuged, the sediment being resuspended in as small a quantity of 1·1 per cent. sodium citrate solution as will produce a suspension. The suspension is standardized and used in various dilutions together with serum of known titres, 1 in 100 and 1 in 1,000. The dilution which gives rapid and clear reaction with high titre serum, and light reaction with low titre serum should be used, and to make the reaction more clear, enough aqueous methylene blue solution is added to the suspension to give an intense blue colour.

With this antigen the Weil-Felix reaction can be carried out at the bedside, and if strongly positive, occurs almost instantaneously.

Agglutinins against suspensions of *Rickettsia prowazeki* appear in the blood earlier than those against *Proteus OX19*, and have been found as early as the 6th day of illness. The technique of the test is simple and the agglutination is easily read under the microscope. *C. W.*

CASTAÑEDA (M. Ruiz) & SILVA (Roberto). Prueba rápida para el diagnóstico del tifo exantemático a la cabecera del enfermo. [**A Rapid Bedside Diagnostic Test in Typhus.**]—*Medicina.* Mexico. 1940. Oct. 10. Vol. 20. No. 373. pp. 505–509. English summary.

"A rapid agglutination test for the diagnosis of typhus fever has been studied and corroborated by a subsequent Weil-Felix reaction.

The method is simple and so far no false positive reactions have been observed. It is only qualitative and is not more sensitive than the ordinary tube agglutination.

" The test is performed with whole blood taken from the ear or the patient's finger. The amount of blood is measured with a platinum loop of 5 mm. diameter and one loopful is mixed with one standard drop of the antigen on a clean slide. The slide is kept moving to and fro during one minute, then the test is read. When the blood and antigen remain in a uniform mixture the test is negative. A positive test shows clumps of the antigen which usually gather around the edge of the drop, forming a ring which can be detected by its whitish colour in contrast with the red cells. A convenient incidence of the light favours the readings. No doubtful tests are considered and no readings are reliable after one minute.

" The antigen is a suspension of *Proteus OX-19* in 11 : 1,000 solution of sodium citrate with 0·2 per cent. formalin. A 24 hour growth in Petri dish is washed in 5 cc. of diluent to obtain the optimum concentration. This emulsion is kept in the refrigerator and gives good reaction for two months."

LEVIN (J.). Materialien zur kolloidchemischen Theorie der Bakterien-agglutination (in der Weil-Felix'schen Reaktion). [**The Colloidal Chemistry of Bacterial Agglutination (the Weil-Felix Reaction).**]—*Jl. Microbiol., Epidémiol. et Immunobiol.* Moscow. 1940. No. 11. [In Russian pp. 34–41. With 3 figs. German summary.]

A series of agglutination tests was carried out with Proteus antigens and varying concentrations of electrolyte and specific sera. Agglutination was noted in various zones of these concentrations and disclosed some relation between the agglutination titres and the globulin content of the immune sera. *D. H.*

DWYER (J. M.) & ATKINSON (Nancy). **Some Observations on Endemic Typhus in South Australia.**—*Med. Jl. Australia.* 1940. Nov. 30. 27th Year. Vol. 2. No. 22. pp. 573–576. [11 refs.]

Agglutination tests with *Proteus OX19* were performed with sera from 351 persons not suffering from typhus fever. The highest titre recorded was 1/80 and was found in only one specimen of serum.

In tests with H and O antigens of *Proteus XK* and *Hill* (a local strain) on 161 specimens of serum sent in for Wassermann reaction it was found that agglutinins for *Proteus OXK*, *O. Hill* and *HXK* were rarely found at a dilution greater than 1/20. Agglutinins of *H. Hill* were encountered more frequently, one specimen of serum had a titre of 1/320, 3 specimens had a titre of 1/160, and six had a titre of 1/80.

Thirty-three local rats were examined but no evidence of typhus infection could be found in any of these animals. *D. H.*

ESSEVELD (H.) & KOUWENAAR (W.). Onderzoek naar het voorkomen van Proteus-X-stammen. [**Characters of Strains of** *Proteus X.*]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1940. Aug. 6. Vol. 80. No. 32. pp. 1871–1895. [12 refs.] English summary.

" The authors have not been able to cultivate Proteus bacilli from the blood of patients suffering from mite fever, shop typhus and scrub typhus.

" Out of 123 Proteus strains derived from human products (chiefly stools from patients with diarrhoea as well as nasal mucus from healthy people) 100 were anindologenic and only 23 indologenic.

" Of these strains 25 gave a strong O-agglutination in rabbit-anti-sera against one of the standard X-strains, viz :

" 20 anindologenic and 2 indologenic in anti-X-Kingsbury serum.

" 3 indologenic in anti-X19 serum.

" As far as the 22 strains that reacted strongly with the anti-OXK-serum were followed up sufficiently, as appears from the ability to agglutinate in sera from mite fever and scrub typhus patients, they all seem to possess more or less an XK-character. Some strains are just as suitable for diagnostic purposes as the standard X-Kingsbury strain, while others react with part of the sera from patients only. The results make it probable that the composition of the XK-antigen in different strains may not be uniform.

" The 3 strains that reacted strongly with the anti-X19 serum react in the same way with shop typhus sera, so they have to be taken as real X19 strains. It seems that with these strains too the X-antigen does not correspond fully with that of the standard X19 strain.

" The examination of 57 Proteus strains derived from guineapig stools and 19 from other sources (putrified meat, mud, rotten vegetables, river-water, and guineapig manure) showed that of these strains by far the majority is anindologenic, viz. 16 and 50 respectively. Against the O antigens none of those strains corresponded to a considerable degree with the standard X strains."

GEAR (James). **Vaccination against Typhus Fever. With Special Reference to Egg Cultures in the Preparation of Vaccine.**—*South African Med. Jl.* 1940. Dec. 28. Vol. 14. No. 24. pp. 476–481. With 2 figs. [28 refs.]

A review of the subject is given at the beginning of this paper followed by a description of the methods employed by the author in preparing vaccine from the virus of louse-borne typhus.

The method of Cox, inoculation of the chick embryo through a hole made in the blunt end of the egg, was found to be most constant and satisfactory. Indeed the growth of the Rickettsiae from an epidemic strain was abundant and appeared in masses. This abundant growth was not apparent until after the third subinoculation in eggs ; in the case of seven-day chick embryos it was observed that all the tissues of the chick were heavily infected ; but in fourteen-day embryos it was often noted that the chorio-allantoic membrane was more heavily infected than the yolk sac or embryonic tissues and gave the appearance of a confluent growth.

In the author's opinion there is no doubt that this method of culture could be successfully used for supplying Rickettsiae in sufficient quantities for large scale production of vaccine against epidemic typhus fever.

A full description of the technique employed is given. *D. H.*

TCHANG (J.) & MATHEWS (G. B.). **Anti-Typhus Vaccine prepared from *Rickettsia prowazeki* cultivated in the Yolk Sac of the Developing Chick Embryo.**—*Chinese Med. Jl.* 1940. Oct. Vol. 58. No. 4. pp. 440–445.

An account is given of the methods employed in preparing vaccines of *R. prowazeki* (Chinese strain) from cultures in the developing chick

embryo. Eggs are incubated at 37°C. for 10 days and are then inoculated with the virus from the brain of an infected guineapig and incubated again for 5 days. The infected egg sac is used for further inoculations and a vaccine is prepared from those eggs which show the heaviest infection with Rickettsiae. This vaccine is standardized by comparison with the numbers of Rickettsiae found in infected intestines of lice. A dose equivalent to that in 100 intestines is employed in the inoculation of men. Guineapigs inoculated with this vaccine in a dose equivalent to that in 10 louse intestines showed a solid immunity to infective doses of typhus virus. The vaccine has also been used in the inoculation of man and more than 40 persons have been so treated.

D. H.

Kurotchkin (Timothy J.) & Wyckoff (Ralph W. G.). **Immunizing Value of Rickettsial Vaccines.**—*Proc. Soc. Experim. Biol. & Med.* 1941. Feb. Vol. 46. No. 2. pp. 223–228.

Comparative studies were made of two methods of preparing vaccines from a virus of Rocky Mountain fever of low virulence :—A. By Zinsser's method of culture on agar slopes. B. By Cox's method of culture in the yolk sac of the developing chick embryo.

The vaccines were then compared as to immunizing power and the relative merits of the two methods for the large scale production of vaccines.

It was found that both vaccines protected in about equal degree, but the Cox's egg method was easier to carry out and was less costly in time and in materials. The same result was obtained when more virulent strains of the virus were used and also with the virus of epidemic typhus. *D. H.*

Heaslip (W. G.). **An Investigation of the Condition known as Coastal Fever in North Queensland : its Separation from Scrub-Typhus.**—*Med. Jl. Australia.* 1940. Nov. 30. 27th Year. Vol. 2. No. 22. pp. 555–564. With 3 charts & 1 map. [21 refs.]

This paper commences with a review of the literature dealing with the local fevers in Queensland. The researches reported deal with these fevers and are divided into two parts : first the investigation of scrub typhus or tsutsugamushi fever and the isolation and investigation of the virus ; second to identify if possible the cause of the so-called " coastal fever " and to separate the two diseases. For this purpose mice were employed and blood clot from patients suffering from coastal fever was inoculated intraperitoneally into these animals. The first 14 patients examined gave no result, the mice apparently being in no way affected, and there were no agglutinins for *Proteus OXK* in serum of patients, but case XV proved to be one of scrub typhus. The serum of this patient agglutinated *Proteus OXK* in a dilution of 1/2,560 and the mice inoculated with blood clot died after about 10 days ; Rickettsiae were seen in smears from the exudate from serous membranes. This virus was passed in series through mice and by this means was sent to Adelaide in S. Australia ; it is interesting to note that in the laboratory there one of the workers became infected with typhus from this same virus some months later, thus completing the chain of evidence.

Investigation of coastal fever : As already stated when mice were inoculated with the blood of patients who were suffering from " coastal

fever " only, these animals did not die, but when these mice were killed and examined they showed infection with a bipolar Pasteurella-like bacillus which was frequently associated with a large Gram-positive bacillus ; the spleen and liver of the mice were enlarged and there was a deposit of fibrin on the surface of these organs. It was not found possible at this time to cultivate the organism from the mice. Those mice which had recovered from the injection of " coastal fever " blood were found to be susceptible to the virus of the local form of endemic typhus. It was also found that mixed infections with coastal fever and endemic typhus were common ; for instance in one case blood drawn from a fever patient and allowed to remain at room temperature gave a pure culture of the pleomorphic bacillus in the serum ; when the clot was inoculated into mice they died in ten days with symptoms of typhus, and Rickettsiae were demonstrated in smears from the organs. At the same time a guineapig inoculated with the blood died in 24 hours from the bacillary infection ; the patient's serum agglutinated *Proteus OXK* up to 1/5,200. It was later found that in cases of coastal fever or in mixed cases of scrub typhus and coastal fever a pure growth could be obtained in the patient's blood if kept at room temperature and from these cultures subcultures could readily be made on or in the usual culture media.

A full bacteriological investigation of this bacillus is being made ; it is apparently related serologically to the anthrax group, and is being reported upon later.

In 19 cases of typhus the bacillus was found in 11, but it is emphasized that this double infection only occurs in strictly localized districts where coastal fever also is met with. An examination of bandicoots and rats, which had been caught in or near swamps where cases had been infected, was made ; 70 rats and 7 bandicoots were examined and over 70 per cent. showed infection with a bacillus similar to that isolated from the blood of the patients suffering from coastal fever. Reasons given for considering that the organism is the cause of coastal fever are as follows :—

1. The bacillus is constantly found in the blood of patients showing the typical signs and symptoms of coastal fever, in direct smears and also in pure culture in serum at room temperature.

2. Monkeys can be infected and the bacillus isolated from their blood.

The most likely vector is a larval mite which also probably carries the virus of scrub typhus from the rat or bandicoot, hence the double infection in people working in these localities.

" 1. It has been shown that cases of typhus comprise only a small percentage of the previously undiagnosed fevers of North Queensland.

" 2. After other known conditions have been separated, the residue of the cases of coastal fever appears to constitute a single disease entity. The main signs and symptoms of the condition are pyrexia, adenitis, headache, nausea, weakness, sore throat and loss of weight.

" 3. Transmission appears to be by a vector which may be a mite, mosquito or tick.

" 4. From patients presenting the clinical signs and symptoms listed above, an organism which is a member of the anthrax group has invariably been isolated. This organism appears to be the causal agent of the disease but it is also found in the blood in cases of typhus. It is present in 70 per cent. of captured rats and bandicoots.

" 5. The organism is pleomorphic, but is usually seen as a Gram-negative bacillus showing bipolar staining, or a Gram-positive, anthrax-like

bacillus. It grows readily on or in artificial media at temperatures between 20° and 30°C., but will not multiply appreciably at 37°C. when the media are directly inoculated with patients' blood."

D. H.

WEINMAN (David). **Bartonellosis : a Public Health Problem in South America.**—*Rev. Med. Trop. y. Parasit.* Habana. 1940. Sept.–Dec. Vol. 6. Nos. 5 & 6. pp. 277–281. [15 refs.] Also in *Jl. Trop. Med. & Hyg.* 1941. May 15. Vol. 44. No. 10. pp. 62–64. [15 refs.]

In Colombia bartonellosis has recently reached epidemic proportions and has caused a marked increase in the death rate in the State. Oroya fever is the most common form, but verruga has also been observed, the parasite has been demonstrated in, and has been cultivated from, the blood of fever cases. In one department of about 100,000 inhabitants there were 4,000 deaths from the disease. It has recently been shown that the parasite of the disease may be present in the blood of convalescent carriers and also in healthy people who have never had the disease, and infection, therefore, may readily be carried from one district to another. In Colombia, body lice and ticks are suspected of carrying the disease. The disease is not confined to areas where sandflies are found as it is in Peru. The Columbian Bartonella is said to be pathogenic for guineapigs, whereas the Peruvian parasite is not. Bartonellosis now constitutes a major health problem in South America. [See also this *Bulletin*, 1940, Vol. 37, pp. 271, 582–584 ; 1941, Vol. 38, p. 209.] *D. H.*

RAY (H. N.) & IDNANI (J. A.). **Observations on Bartonellosis in Dogs in India.**—*Indian Jl. Vet. Sci. & Animal Husbandry.* 1940. Sept. Vol. 10. Pt. 3. pp. 259–270. With 2 figs. (1 coloured) on 1 plate & 1 chart. [40 refs.]

A résumé of the knowledge of Bartonella is given and the disease produced by *B. canis* in dogs in India is described in detail. The presence of *B. canis* in dogs produces a progressive and fatal anaemia accompanied by high fever. The morphological characters of the parasite are fully described. *D. H.*

JIMINEZ (Jose F.) & BUDDINGH (G. John). **Carrion's Disease. II. Behavior of Bartonella Bacilliformis in the Developing Chick Embroyo.**—*Proc. Soc. Experim. Biol. & Med.* 1940. Nov. Vol. 45. No. 2. pp. 546–551. With 3 figs.

The observations reported in this paper indicate that *Bartonella bacilliformis* (4 strains were tested) is readily cultivated within the allantoic fluid of the developing chick embryo maintained at room temperature, 25° to 28°C. The growth in this environment is much more rapid and more abundant than in any of the artificial media so far employed. It was also found that the allantoic fluid by itself is a suitable medium for the growth of this micro-organism *in vitro*. The first passage of the organism from artificial media induces the development of a granulomatous lesion bearing a close resemblance to that of the human cutaneous infection (verruga). In these lesions the presence of *B. bacilliformis* can be readily demonstrated. It has not yet been found possible to carry the growth beyond the first passage in the chick embryo fluid. *D. H.*

GUINDY: REPORT OF THE KING INSTITUTE FOR YEAR ENDING 30th SEPT., 1939. pp. 34–37.—**Sandfly Fever Enquiry under the Director, King Institute, Guindy** [ANDERSON (W. M. E.), PANDIT (C. G.), SANJIVA RAO (R.) & SHORTT (H. E.)].

The life history of *P. papatasi* has been further studied in the field in the Punjab. Experiments were carried out to test the effect of various insecticidal solutions and satisfactory results were obtained with several of the kerosene base solutions. Sera from convalescents were collected, dried and despatched to the King Institute, Madras, for testing. Seventy of these sera were tested on the spot and the presence of virus was detected in 40. *D. H.*

OLITSKY (Peter K.). **Hans Zinsser and his Studies on Typhus Fever.**—*Jl. Amer. Med. Assoc.* 1941. Mar. 8. Vol. 116. No. 10. pp. 907–912.

BLUMER (George). **The Rickettsial Diseases, with Special Reference to those of Importance along the Atlantic Seaboard.**—*Bull. New York Acad. Med.* 1941. Apr. Vol. 17. No. 4. pp. 280–294.

LEPROSY.

PRÉCIS OF ABSTRACTS IN THIS SECTION.

VICKERS (p. 456) describes the first case of leprosy in the Royal Navy to be recorded for 100 years.

HAYWARD (p. 456) reports on a leprosy survey in Rajputana, where an incidence of 0·08 per cent. was found. This is low, but the proportion of lepromatous cases was relatively high. For control he advocates the institution of small colonies in the villages, and treatment at existing hospitals and dispensaries. DE SIMON (p. 456) shows that in Ceylon most of the cases are found in the densely populated and humid areas near the coast. Surveys have increased the number of known lepers and a large proportion of these are now isolated. Contact examination and supervision of the patients are now provided for.

MALAIHOLLO (p. 457) has studied leprosy in a village near Batavia, in which the incidence is high though the disease is benign in character. There is a high incidence in contacts. The author attributes the mildness of the disease to the fact that the people are well fed and not subject to epidemic diseases.

VAN HOOF (p. 457) gives figures of the cases treated in the Belgian Congo during 1939, and indicates the measures taken to control the disease.

DEGOTTE (p. 458) reports on a survey in the Belgian Congo, where the high rate of 5·29 per cent. was found. In areas where village isolation has been well carried out the incidence is much smaller than where this is not the case, and segregation is therefore considered to be the best method of control in this area.

HASSELTINE (p. 458) suggests that the men admitted to the U.S. Marine Hospital, Louisiana, with leprosy during the last 20 years were all infected in childhood, since all were born in the Southern States, in which leprosy is endemic.

Analysing leprosy in Rio de Janeiro, ARAUJO and DE ALBUQUERQUE (p. 458) point out that the age of onset in foreigners is commonly over

20 years, whereas in Brazilian natives the incidence rate below that age is much higher. Adult foreigners are at least as susceptible to the disease as Brazilian children.

COLLIER (p. 459) gives details of the results of experiments in which pieces of human lepromata were planted beneath the skin of monkeys which had been given a diet of Colocasia over long periods. Four of the animals developed symptoms similar to those of leprosy in man, and in some of them skin snips from the ears, and nasal smears, were positive for acid-fast bacilli. OTA and NITTO (p. 461) have successfully transmitted material from human lepromata in seven passages through fowls. Details of technique are given. Lesions rich in acid-fast bacilli, and containing round cell infiltration and large vacuolated cells with enclosed bacilli, were demonstrated. These lesions increased in degree and in rapidity of development in the later passages.

EVANS (p. 461) reports failure to cultivate *Myco. leprae* on a number of media.

TORSSUJEW (p. 462) describes the degenerative changes found in nerve tissue in leprosy, which are similar even in the most diverse forms of the disease.

OTA and NITTO (p. 462) have used infected fowl muscle as antigen for the Mitsuda reaction, with results almost equal to those obtained with human lepromin.

IGARASHI and HAYASHI (p. 463) give information on the progress of patients who ten years ago gave atypical Mitsuda reactions. They point out that a negative result to the test is often the prelude of relapse. The influence of sex in relapse is discussed.

MALTANER (p. 463) finds that the sera of lepers react to a high degree with antigen from tubercle bacilli in the complement fixation test, but very little with a syphilitic antigen in the absence of syphilis.

SOETOPO (p. 464) describes the condition of a patient in whom the lepra reaction assumed various forms, engorgement, a generalized rash and even bulla formation. There was abscess formation in which no bacteria other than leprosy bacilli were found, and the author considers that *Myco. leprae* can itself cause suppuration in some circumstances.

WADE (p. 464) discusses relapse in tuberculoid leprosy, but remarks that it is rare for this form to be transformed into the lepromatous type. COCHRANE (p. 464) also considers that lepromatous disease does not originate from tuberculoid lesions, but may originate from what he names intermediate lesions. He gives a table in which the characters of tuberculoid and intermediate lesions are described.

PRENDERGAST (p. 465) has studied the eyes of lepers in the United States. Negroes seem to be specially susceptible to ocular complications, of which the commonest is infiltration of the deep layer of the cornea. The iris is also frequently attacked but lesions of the retina, optic nerve and lens are rare. Methods of treatment are discussed.

TISSEUIL (p. 466) reports favourably on the intra-arterial injection of chaulmoogra oil in the treatment of perforating ulcers. DAVISON (p. 466) has used Grasset's tubercle endotoxoid with some benefit in neural cases of tuberculoid type. COLLIER (p. 467) reports on the use of diathermy in leprosy; it was applied over the kidney with a view to stimulation of the suprarenal, and produced considerable improvement in a number of cases, especially in the reduction of the frequency of lepra reactions. The theoretical basis of the treatment is discussed.

C. W.

British Empire Leprosy Relief Association. **Report for 1940.**—24 pp. With 1 fig. London: 25 Kidderpore Avenue, N.W.3.

Vickers (H. R.). **A Case of Leprosy.**—*Jl. Roy. Nav. Med. Serv.* 1941. Jan. Vol. 27. No. 1. pp. 87–90. With 2 figs.

This case is of interest as the first recorded case in the British Royal Navy in the last one hundred years. The patient, with forty years service, developed maculo-anaesthetic lesions, negative to lepra bacilli, shortly after a nervous breakdown. He had served for several years on the China station not long before, but the source of his infection could not be traced. The prognosis is good. *L. Rogers.*

Hayward (E. W.). **Report on the Leprosy Survey of Jodhpur State, 1937 to 1939.**—*Leprosy in India.* 1940. Oct. Vol. 12. No. 4. pp. 138–146.

This is a report of a survey of the largest of the Rajputana States of Central India, which has a comparatively low rainfall. The census of 1931 returned only 117 cases and the hospitals showed few attendances for leprosy. The propaganda, survey and treatment method was carried out from 1937 to 1939, and the examination of 960,875 persons revealed 888 cases in 1,029 villages. This gives the low rate of 0·08 per cent., with 43·81 per cent. of lepromatous cases, which is an unusually high proportion for India. The age incidence was also peculiar in showing only 5·4 per cent. of cases up to 14 years of age and 57·8 per cent. from 40 years upwards. The high proportion of males found is attributed to the difficulty of examining females owing to the purdah system. The authors consider that the disease is not decreasing and that the total number of cases in the State is between 2,000 and 3,000, the isolation of which is beyond the resources of the State, so they advise small colonies in the villages, and treatment as out-patients at the existing hospitals and dispensaries. *L. R.*

de Simon (D. S.). **Leprosy and its Control in Ceylon.**—*Jl. Ceylon Branch Brit. Med. Assoc.* 1940. Sept. Vol. 37. No. 3. pp. 171–191. With 1 map, 1 diagram, 3 charts & 9 figs. on 3 plates. [17 refs.]

This paper deals with the progress that has been made in Ceylon since, in 1932, sole reliance on a compulsory segregation gave place to modern methods. Surveys showed that 85 per cent. of cases were found within five miles of the humid coast, which is the most densely populated part. The survey was followed by propaganda for education of the people, training of medical officers in early diagnosis and the establishment of out-patient clinics for the treatment of uninfective cases. Leprosy hospitals and settlements were established, arrangements made for repeated examinations of all contacts and supervision of discharged negative cases and those permitted home isolation. The known number of 557 cases in 1921 was raised by 1939 to 3,648, of which 2,548 were found by the surveys; 1,031 infective cases are now isolated. Modern treatment is expected to restore the health of the majority of the early cases and to reduce the number of infective ones. *L. R.*

MALAIHOLLO (J. F.). Lepra in de desa Wates (Res. Batavia en het resultaat van een bloedgroeponderzoek onder leprozen en gezonden in Wates en Blora. [**Leprosy in Wates, Batavia.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1940. Sept. 24. Vol. 80. No. 39. pp. 2296–2312. With 1 map & 1 fig. English summary.

"1. A leprosy survey is carried out in Wates, a village in the Regency of Mr. Cornelis (Province of West-Java). In 1937 the density was 30 pro mille; in 1939 38 pro mille (population of Wates: 1661).

"This very high density of the disease is probably ascribable to frequent and long lasting contact, resulting from the light-heartedness with which the population accepts the presence of the disease. Frequent and long lasting contact cause a high disease-rate (SITANALA, Cairo Congress, 1938).

"2. The endemic at Wates is benign; we found mostly light N-cases (70 per cent. N_1 and 14 per cent. N_2).

"The benign character of the endemic is probably due to the good general physical condition of the population.

"For the continuation of this favourable aspect it will be of great importance that there is neither scarcity of food nor any epidemic (malaria, dysentery, etc.) in Wates.

"3. The experience in other regions shows that in the first stage of a leprosy endemic we find preponderantly C-cases.

"In Wates however, where leprosy has existed for about 30 years, the C-cases are scarce (11 per cent.).

"4. Comparing the results of the surveys in 1937 and in 1939 it seems to us that leprosy at Wates is still spreading.

"5. An intensive anamnestical inquiry into relationships among the lepers results in a high rate of housemate infection cases (52 per cent.).

"6. Chaulmoogra treatment was given during two years. Disappearance of lesions in 7 cases and improvement in 8 cases indicate that chaulmoogra treatment is of great value.

"7. A small number of patients have already on their own initiative come to house-isolation, and propaganda for this idea may be expected to yield further results.

"8. Blood grouping of lepers and non-lepers in Wates and Blora showed no difference in blood group rates.

"There is no relation between blood group and type of leprosy."

CONGO BELGE: RAPPORT SUR L'HYGIÈNE PUBLIQUE AU CONGO BELGE PENDANT L'ANNÉE 1939 [VAN HOOF (L.)]. pp. 48–53.—Lèpre. [**Leprosy.**]

During 1939, 74,397 cases of leprosy were treated throughout the Colony; 6 new European cases were diagnosed. About 10,000 fresh cases were discovered, especially in the Provinces of Coquilhatville, Costermansville and Elisabethville, in surveys made by the *Fondation Père Damien.* Preventive measures include classification of lepers, isolation of infective cases and intensive treatment of those who are likely most to benefit from it. Segregation is at present only partially employed and will be improved as time goes on and as the natives themselves recognize its value. Isolation villages of not more than 400 inhabitants are aimed at; these villages have land for agriculture,

dispensaries and hospitals, and are able to subsist on their own resources. They are administered according to local custom. Tables of the numbers of patients in the leprosaria of the various provinces are given. *C. W.*

DEGOTTE (J.). **Epidemiological Leprosy Survey in the Nepoko, Kibali-Ituri District, Belgian Congo.** With an Introduction by A. DUBOIS.—*Internat. Jl. Leprosy.* Manila. 1940. Oct.–Dec. Vol. 8. No. 4. pp. 421–444. With 6 figs. (1 map).

This survey was part of the Belgian Congo plan of examining the whole of the population in certain areas for sleeping sickness and other diseases. The area is a tropical one with high rainfall, so it is not surprising that the high leprosy rate of 5·29 per cent. was found among the 38,120 persons examined, who included 37,442 of a Bantu race and 678 pygmies. The latter showed the still higher figure of 7·07 per cent. The age incidence of the total cases showed only 10·35 per cent. from birth to the 20th year of age, 73·41 from 20th to 50th years, and 16·24 per cent. above 50 years of age. Lepromatous cases formed only 8·61 per cent. of the total, Nt and NT cases of the Cairo classification 14·95 per cent. and the remaining 76·44 per cent. were Na and Ns cases. It is noteworthy that in 43 per cent. of the foci the appearance of lepromatous cases had soon been followed by an extension of the disease. Microscopical examinations were found necessary for the discovery of diffuse lepromatous cases. In areas in which village isolation had been relatively well carried out the cases were only about one-third as numerous as where the reverse was the case. Segregation is therefore considered to be the best method of combating leprosy in this area of the Belgian Congo. *L. R.*

HASSELTINE (Hermon E.). **Leprosy in Men who served in United States Military Service.**—*Internat. Jl. Leprosy.* Manila. 1940. Oct.–Dec. Vol. 8. No. 4. pp. 501–508.

The author has tabulated the cases of leprosy admitted to the U.S. Marine Hospital at Carville, Louisiana, during the twenty years 1921–40, among former military service men dating back to Spanish War Veterans. As they were all born in the leprosy infected Southern States it is suggested that most of them contracted the disease in childhood before entering military service. *L. R.*

ARAUJO (H. C. de Souza) & DE ALBUQUERQUE (A. F. Rodrigues). Alguns aspectos epidemiológicos da lepra no Brasil. A lepra na cidade do Rio de Janeiro. [**Leprosy in Rio de Janeiro.**]—Reprinted from *Ata Médica.* 1940. Aug. Vol. 6. No. 2. pp. 63–90. English summary.

"*Sexual incidence*:—Out of 528 lepers, whose register cards we are analysing, 282 or 53·4 per cent. were of the male sex, and 246 or 46·6 per cent. of the female sex, giving a ratio of 1·14 men to 1·0 woman.

"This ratio does not reflect the real situation of lepers in the whole of Brazil, not even in any of its States. This ratio for native Brazilians is of one man to one woman, among Brazilians born of foreigners 1·55 to 1·0, and among foreigners of 2·436 to 1·0 woman. This latter ratio is accounted for by the predominance of male immigrants.

"*Racial incidence*:—Out of 528 leper records studied, 431 or 81·6 per cent. are of the white, 56 or 10 per cent. are mestizoes, and 41 or 7·7 per cent. of the negro race. All foreign lepers are of the white race.

"*Age incidence*:—The onset of leprosy in the three groups of patients took place at the following ages.

Age	Groups of patients		
	A. Native Brazilians	B. Brazilians born of Foreigners	C. Foreigners
From 0 to 20 years ...	37·9	45·0	5·0 per cent.
From 21 to 50 years ...	52·2	46·0	62·2 ,, ,,
Above 50 years ...	9·8	9·0	32·7 ,, ,,
	99·9	100·0	99·9 ,, ,,

"As may be seen, 94·9 per cent. of foreigners had the outbreak of leprosy after the 20th year of age. This fact proves that the grown-up immigrants, coming from European countries where leprosy is no more endemic, are as susceptible as, or even more susceptible than Brazilian children descending from Brazilian native parents to leprous infection.

"*Civil state*:—Out of 528 lepers of these statistics, 243 or 46 per cent. are married, 161 or 30·5 per cent. unmarried, 77 or 14·6 per cent. widowed, and 47 or 8·9 per cent. younger than 15 years.

"*Occupation*:—Out of 528 lepers, 483 or 91·5 per cent. carry on various occupations as follows: Housekeeping 160 (30·3 per cent.), workmen 101 (21 per cent.), trade 48 (10 per cent.), chambermaids 26 (5·4 per cent.), civil service (for the most part railway men of the Central Railway of Brazil: E.F.C.B.) 23 (4·7 per cent.), school boys and girls 23 (4·7 per cent.), agricultural labourers 21 (4·3 per cent.), carpenters 16 (3·3 per cent.), motorcar drivers 14 (2·6 per cent.), tailors 10 (2·1 per cent.), soldiers 8 (1·7 per cent.), washerwomen 7 (1·4 per cent.), sailors 4 (0·8 per cent.), hairdressers 3 (0·6 per cent.), schoolmasters 2, porter 1, and without occupation 45 or 8·5 per cent."

DE SOUZA-ARAUJO (H. C.). **Infection of the Hamster** (*Cricetus cricetus*) **with Human Leprosy, with Bacillemia.**—*Internat. Jl. Leprosy.* Manila. 1941. Jan.–Mar. Vol. 9. No. 1. pp. 63–68. With 2 figs. on 1 plate.

[See this *Bulletin*, 1941, Vol. 38. No. 4. p. 218.]

COLLIER (D. R.). **Inoculation of Monkeys with Leprosy, following a Diet of Puak** (*Colocasia*).—*Thai Sci. Bull.* 1940. Vol. 2. pp. 101–108. [Summary taken from *Internat. Jl. Leprosy.* Manila. 1940. Oct.–Dec. Vol. 8. No. 4. pp. 549–550. Initialled H. W. W.]

Following the ideas of Oberdoerffer, the author undertook an inoculation experiment with monkeys—the ordinary long-tailed brown

Rhesus native to the country—fed chiefly on *puak* (*taro*). The tubers were given boiled, as they were rejected when raw. Starting with two animals, the number had been increased to 30 at the time of the report, but in most of them the experimental period had been too short for results to be evident ; only 12 are referred to specifically, four of them controls not given the colocasia diet. Four of the animals whose postinoculation period was six months or more had developed " symptoms similar to those seen in leprosy in humans " ; a fifth one, similarly treated, remained negative. Another one, which was given injections of a sapotoxin from colocasia as well as that vegetable for food, developed abscesses containing acid-fast bacilli as well as other symptoms. The following is taken from the notes on the more interesting animals. *No. 1* : Diet started September 1st, 1938. On October 1st a piece of a leproma was inserted under the skin of the back. In six weeks there developed inflammation of the face, palms and soles ; face deep red, somewhat swollen and infiltrated ; inoculation lump more than doubled in size. This " reaction " subsided after about a month but the thickening and redness of the face remained ; since then it has been highly inflamed at times and has never returned to normal. On March 1st, 1939, a smear from the nodule on the back showed typical acid-fast bacilli. Animal reinoculated on April 17th. Ear clips on May 20th and 30th negative, but a nasal smear was positive on the latter date and repeatedly thereafter. On July 24th an ear clip was positive, and this part has remained so ever since. In October, a year after the first inoculation, a diffusely swollen area of deep red coloration appeared across the back to the level of the lumbar vertebrae ; smears negative. Ears, and also nipples, red and definitely enlarged. *No. 3* : Inoculated December 15th, 1938 ; reinoculated April 17th, 1939. On June 23rd and September 27th nasal smears positive ; ear clip negative. In September the face around the eyes became intensely red and indurated. This condition, which has persisted, has not been noted in any of the control monkeys. *No. 7* : Inoculations as with No. 3 having resulted in no skin changes, a third one was made on August 4th. An abscess formed locally ; smears showed extremely numerous acid-fast bacilli. This lesion healed spontaneously within 9 days. On September 27th there was found on the opposite side of the back a large, soft, fluctuating mass, $1 \times 0{\cdot}75$ inches, from which was aspirated a purulent fluid which contained acid-fast bacilli. The mass remained indurated and has persisted. Similar though smaller masses occurred on both wrists. There has been loss of hair on the back and tail. Face unchanged, but the nasal smear has been positive. On November 1st ulnar nerves found enlarged. *No. 11* : Inoculated as usual August 5th, beginning September 14th this animal was given a number of injections of sapotoxin prepared from colocasia. By October 1st there was on the opposite side of the back a mass which by November 1st measured approximately $1 \times 0{\cdot}75$ inches and that contained acid-fast bacilli. A second mass, also containing such bacilli, has appeared below the first one. Eye-brows thickened and somewhat reddish, with indications of paresthesia around the eye. Loss of hair over back and tail. Highly interesting photographs of some of these animals are reproduced. Rabbits, guinea-pigs and ordinary pigs have also been experimented with ; one of the last developed a leprous lump. [In correspondence the author states that the animals have continued to develop new lesions.]

Ota (Masao) & Nitto (Shuichi). Durch Sieben Passagen hindurch ohne ausnahme Gelungene Uebertragungen von menschlicher Lepra bei Hühnern. [**Successful Transmission of Human Leprosy through Seven Passages in Fowls.**]—*Japanese Jl. Experim. Med.* 1940. Oct. 20. Vol. 18. No. 5. pp. 327–344. With 8 figs. (4 coloured) on 2 plates. [19 refs.]

This is an important paper describing a method of uniform infection of hens with human leprosy material in continuation of previous work. [See this *Bulletin*, 1940, Vol. 37, p. 628].

The authors have found hens the most suitable animals, of many they have tried, for producing infection by injection of human leprosy material into the breast muscles. In the vast majority of the birds more or less extensive granulomata result, with the macroscopical appearances of orange coloured spots or lines, which are usually very rich in acid-fast bacilli. The results, however, are not certain and passages to other animals are not possible.

By using for injection 0·5 gm. of the deposits of lepromata, mixed with a standard rice mixture, uniform success was obtained and passages were successful. By injecting 0·5 gm. of leproma deposit in 5 cc. physiological salt solution, with 0·05 gm. of Kieselguhr, trypan blue and potassium iodide, deep into the small pectoral muscle of hens, and making a control injection without the leprous material into the muscle of the other side, the following results were obtained :— After three or four months the control injection had become completely absorbed and the muscle was normal. In strong contrast were the changes in the infected muscle, for its surface showed yellow spots, fairly closely distributed, and the muscle tissue similar yellow spots and lines. A very rich occurrence of acid-fast bacilli could be demonstrated in the affected tissues. Dark blue specks of trypan blue were also visible. These changes persist over a year and even appear to increase slowly. With increasing number of passages the lesions also develop more quickly. Injections of the diseased tissue into guineapigs were negative to the tubercle bacillus, nor could the acid-fast bacilli be cultivated on media suitable to the latter organism.

Microscopically both small-celled infiltration and large vacuolated cells containing acid-fast bacilli were demonstrated. The successful passage of the infection through a series of seven birds, with increasing degree and rapidity of development, led the authors to consider that their method of regular infection of hens with human leprosy material furnishes the essentials for chemotherapeutic experiments to find a more effective treatment of the disease. A black and white and a coloured plate well illustrate the conditions described. *L. R.*

Evans (Florence L.). **Attempted Cultivation of** *Mycobacterium leprae.*—*Internat. Jl. Leprosy.* Manila. 1940. Oct.–Dec. Vol. 8. No. 4. pp. 481–493. [35 refs.]

As the results of this investigation were negative it will suffice to mention that the media used were prepared with legumes, milk, egg or egg-yolk, or various combinations of them. Minced chick embryo, Corper's potato medium, dextrose broth, or dextrose brain semi-solid agar also failed. *L. R.*

TORSSUJEW (N. A.). **Morphologic Changes of the Cutaneous Nerves in Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1940. Oct.–Dec. Vol. 8. No. 4. pp. 467–480. With 8 figs. on 2 plates.

After a discussion of some of the earlier literature the author records and illustrates his own observations on this subject.

In the most varied manifestations of leprosy a similar picture of nerve degenerative changes are found. The few nerve fibres found in the subcapillary layer nearly all show on impregnation with silver thickening with fragmentation of the cylindrical segments, with tumefaction and infiltration of the nerve sheaths. Similar changes are met with in the nerve fibres in the remnants of sweat and sebaceous glands. In the lower layers of the epidermis may be found a mass of large, round sac-like bodies without projections or nuclei. These changes are more developed in leprous granulomata than in the infiltrated macule. After the disappearance of the leprous granulomata the nerve elements are decreased in the atrophied skin. The lamellae of the Pacinian corpuscles are shrunken and may be entirely lacking in nerve fibres. *L. R.*

LOWE (John) & DHARMENDRA. **Studies of the Lepromin Test. A Review of the Literature and a Discussion of the Lines of Future Work.**—*Leprosy in India.* 1940. Oct. Vol. 12. No. 4. pp. 121–137. [55 refs.]

This is a useful review of the literature of the Mitsuda or lepromin test with numerous references which will be useful to other workers. They suggest further work to standardize the substances used, and to study the nature of the resulting reactions and the significance of positive and negative reactions. *L. R.*

OTA (Masao) & NITTO (Shuichi). Ueber Mitsudasche Reaktion, Angestellt mit einem Antigen aus Leprösem Gewebe von mit menschlicher Lepra infizierten Hühnern. [**The Mitsuda Reaction with Infected Fowl Tissue as Antigen.**]—*Japanese Jl. Experim. Med.* 1940. Oct. 20. Vol. 18. No. 5. pp. 345–351. With 4 figs. on 1 plate.

The authors record results with the Mitsuda reaction, using as antigens the tissues of hens infected by the method described in a foregoing abstract (p. 461). In table I they record the results of using ordinary leprous nodule emulsion (L.A.) in comparison with extracts of the diseased muscle containing numerous acid-fast bacilli (AI) and of the liver with few or no such bacilli (AII) obtained from one of their second passage infected hens. Another set of antigens was prepared from a fifth passage hen, with the addition of one from the spleen tissue. The tests were carried out in various types of leprosy, and in controls, with results almost equal to those of the original Mitsuda reactions. The tests with the fifth passage animal tissues were the stronger of the two series, including that prepared from the hen's spleen. *L. R.*

IGARASHI (Masa) & HAYASHI (Fumio). **Observation of Patients with Atypical Mitsuda Reactions, after an Interval of Ten Years.**—*Internat. Jl. Leprosy.* Manila. 1940. Oct.–Dec. Vol. 8. No. 4. pp. 457–464. With 1 fig.

This is an interesting report on subsequent observations on cases that gave atypical Mitsuda reactions ten years previously. It is best summarized in the authors' own words :—

" 1. Of a total of 35 improved lepromatous cases the lesions of which had been resolved long before the tests were made and which gave positive reactions, 28, or 80 per cent., have remained well, without relapse.

" 2. The other 7 cases of this original group (20 per cent.) have relapsed, the Mitsuda reaction of course becoming negative. This observation answers the hitherto unsettled question of whether or not improved lepromatous cases that give positive reactions may undergo relapse.

" 3. Of a total of 11 similarly improved lepromatous cases that gave only weakly positive (±) Mitsuda reactions, only 5 have relapsed. The other 6 have, unexpectedly, remained without further symptoms, indicating an about even chance of favourable outcome in such cases.

" 4. Most of the lepromatous cases with resolved lesions that gave negative Mitsuda reactions have relapsed. Such cases are regularly of poor prognosis.

" 5. Three neural cases whose reactions were repeatedly negative have all relapsed. It is noteworthy that this significant result of this test precedes by a considerable time the unfavourable turn of the clinical course.

" 6. One neural case with a typical positive reaction that has, nevertheless, become lepromatous is mentioned.

" 7. The element of sex appears to have influenced the outcome of these cases. (*a*) Among the resolved lepromatous cases with positive reactions that have not relapsed are 12 males and 16 females, a ratio of 1 : 1·3, which is in contrast with the usual ratio of 2 : 1 to 3 : 1 among leprosy cases in general. (*b*) On the other hand the 7 cases of this category that have relapsed are all males. (*c*) The six resolved cases with weak reactions that have not relapsed are all females, but all cases with that grade of reaction were of that sex. (*d*) The three neural cases that had negative reactions and that relapsed were all males. Even as males predominate numerically among leprosy cases in general, and among female cases the neural type is relatively predominant, so in the cases the subject of this study there is evidence that the prognosis is more favourable and the disease process more stable among females than among males." *L. R.*

MALTANER (Elizabeth). **A Study of the Sera of Lepers in Quantitative Complement-Fixation Tests for Syphilis and Tuberculosis.**—*Amer. Jl. Trop. Med.* 1940. Nov. Vol. 20. No. 6. pp. 843–848. [13 refs.]

This paper confirms previously reported positive complement-fixation reactions of the sera of lepers with tubercle antigen and demonstrates a high degree of reactivity. In the case of the test for syphilis, contrary to the findings of others, the reactivity of the leprosy sera was practically absent, and when definite reactions were obtained, syphilis could not be excluded. *L. R.*

SOETOPO (M.). Een atypisch beloop der lepra-reactie. [**Atypical Leprous Reactions.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1940. Nov. 26. Vol. 80. No. 48. pp. 2801–2808. With 1 chart & 2 figs. on 1 plate. English summary.

The patient was an Indo-European, 28 years of age, who developed unusual types of leprous reaction. His disease had started some 13 years earlier. He showed from time to time a leprous reaction which varied. Thus, in June 1938, it showed itself as engorgement of the nodules present. In September, it was evidenced by a generalized rash, painful and resembling erythema nodosum, each spot being topped by a vesicle. In the following July, he had another attack; this time bullae becoming pustular, like impetigo contagiosa and bullosa, and abscess formation occurred. In the leucocytes and lepra cells acid-fast bacilli were present, but attempts at cultivation proved negative. The author states that this case confirms the belief of STEIN and KYRLE that *Myco. leprae* can, in certain circumstances, cause suppuration. [The first and third of these are mentioned by ROGERS and MUIR in their book on leprosy; the second must be more rare.] *H. H. S.*

WADE (H. W.). **Relapsed and Borderline Cases of Tuberculoid Leprosy.**—*Leprosy Review.* 1941. Jan. Vol. 12. No. 1. pp. 3–17. With 10 figs. [24 refs.]

This illustrated paper discusses relapses and transformations in the tuberculoid form of leprosy. Of 12 bacteriologically positive cases followed up in the Philippines seven relapsed, and brief details of these are recorded. Similar occurrences have been reported from Calcutta and elsewhere. It is, however, rare for this type to be transformed into the lepromatous form and this did not occur in any of the Philippine cases cited, although in two of them activity persisted for three years. The more numerous lepra bacilli during a relapse may cause the lepromatous stage to be suspected. The author concludes that the transformation of a tuberculoid case is not readily accomplished and caution must be exercised in diagnosing it. *L. R.*

COCHRANE (R. G.). **Development of the Lesions of Leprosy with Particular Reference to Tuberculoid Leprosy and the Significance of the Lepromin Test.**—*Internat. Jl. Leprosy.* Manila. 1940. Oct.–Dec. Vol. 8. No. 4. pp. 445–456. With 24 figs. on 6 plates & 1 text fig. [12 refs.]

This worker also discusses the possibility of the transformation of tuberculoid cases into other forms. He doubts whether those that became lepromatous were really tuberculoid in the first instance, because they were consistently negative to lepromin, so he classes them as an intermediate variety. He goes on to describe as "basic lesions" what he calls incipient lesions of childhood, simple macular lesions and tuberculoid macular lesions, and illustrates his ideas of their development and transformations in an elaborate diagram, which should be consulted by those interested in such theoretical

conceptions. He summarizes his description of major tuberculoid and intermediate lesions respectively in the following statement :—

Tuberculoid Cases	*Intermediate Cases.*
Lesions : Raised, erythematous and infiltrated, with sharply defined edges which remain distinct, even when they extend.	Raised erythematous lesions with a more succulent appearance ; edges, while infiltrated, tend to be less well defined.
Reactive stage : Considerable tenderness of lesions. Febrile period, if any, of short duration. Emaciation seldom marked and patient rarely so ill as to need hospitalization.	During reactive stage marked burning and tenderness of lesions, which may ulcerate. With fever, sometimes prolonged, and emaciation, patient may appear extremely ill, and often requires hospitalization.
Bacilli : Lesions positive, usually becoming negative within six months.	Positive, not becoming negative in less than 9 to 18 months.
Histology : The granuloma usually extends to the epidermis, with no sub-epidermal clear zone. Giant and epithelioid cells well marked. No foamy cells.	The granuloma tends to respect the subepidermal zone, where dilated capillaries are frequently seen. Tuberculoid structure not so obvious, giant cells tending to be fewer or smaller, and may be absent. Foamy cells not infrequently seen, sometimes in the same field as giant cells.
Lepromin : Reaction positive.	Reaction negative.
Nerve abscess : Common.	Abscess unusual.

L. R.

COCHRANE (R. G.) & SLOAN (T. B. M.). **Tuberculoid Leprosy affecting the Palpebral Portion of the Lachrymal Gland.**—*Leprosy in India.* 1940. July. Vol. 12. No. 3. pp. 83–84. With 3 figs. on 2 plates.

PRENDERGAST (J. J.). **Ocular Leprosy in the United States.**—*Arch. Ophthalmology.* 1940. Vol. 23. pp. 112–137. [Summary taken from *Internat. Jl. Leprosy.* Manila. 1940. Oct.–Dec. Vol. 8. No. 4. pp. 535–536. Signed H. E. HASSELTINE.]

This paper reports findings of a six months intensive study of eye conditions in patients at the U.S. National Leprosarium. The examination included testing of vision ; examination of the lids, brows, conjunctiva, lacrimal sac and extraocular muscles ; external and slit lamp examination of the cornea and iris ; tonometric measurement ; visualization of the lens and, when possible, examination of the fundus with hand and binocular ophthalmoscope. Of the 350 patients examined, 91 per cent. were found to have ocular involvement of some kind. Blindness of both eyes was found in 20 (5·7 per cent.) and of one eye in 29 others (8·2 per cent.) ; but only 86 (24·5 per cent.) had normal vision in both eyes, and 58 others (16·5 per cent.) in one eye. A racial element appeared in the fact that, though Mexicans constituted only 25 per cent. of the patients examined, 37 per cent. of those with normal vision were of that race ; white Americans, 50 per cent. of the total, contributed only 23 per cent. of the normals ; Negroes seemed especially susceptible to ocular complications. The cornea is the ocular tissue most vulnerable to leprosy, the most common

change being an infiltration of the deep layer of the stroma. The iris showed all gradations of involvement from a mild degree of swelling with obliteration of the anterior pattern and ectropion uveae to almost complete fibrosis and atrophy. In the ciliary body there were scattering chronic inflammatory foci around the major arterial circle. In the sclera the lesions were almost always confined to the corneo-scleral junction. Lesions in the retina, optic nerve, and lens were rare. The mode of infection of the eye was thought to be endogenous. One patient showed an elevation of intraocular tension and 16 had secondary glaucoma. Xanthelasma is quite frequent on the ocular adnexae. Various types of treatment were tried and observed for several months. Quinine bisulphate ointment and thyroxin locally gave fair results in clearing up corneal infiltration. Dionin and chaulmoogra oil were not beneficial. Protein shock therapy gave good results in treatment of acute lesions. Postoperative infection in operated cases was not encountered, though the leprous eye does not tolerate surgery very well. Emphasis is placed on the importance of protection of the eye by various means as a prophylactic measure. Twenty-eight enucleated eyes were sectioned and studied, with findings as follows :—

Location	Lesions found	Bacilli found
Cornea	22	18
Sclera	None	None
Iris	13	13
Ciliary body	19	14
Choroid	15	9
Retina and optic nerve ...	None	None

GREENGRASS (J. J.) & SILVERMAN (Irving). **Leprosy, a Case Report.**—*Jl. Med. Soc. of New Jersey.* 1940. Dec. Vol. 37. No. 12. pp. 583–585. With 3 figs.

BLACKBURN (J. H.). **Leprosy with Rapid Progress.**—*Med. Jl. Australia.* 1940. Nov. 2. 27th Year. Vol. 2. No. 18. p. 440.

TISSEUIL (J.). Injections intra-arterielles d'huile de chaulmoogra dans le traitement de la lèpre. [**Intra-Arterial Injection of Chaulmoogra Oil in Treatment of Leprosy.**]—*Internat. Jl. Leprosy.* Manila. 1940. Oct.–Dec. Vol. 8. No. 4. pp. 465–466.

This brief note records a trial of intra-arterial injections of 2 to 4 cc. of chaulmoogra oil, with 4 per cent. guaiacol, into the femoral artery twice a week in two cases of leprosy with perforating ulcers of the feet, with a view to obtaining the direct action of the oil on the local condition. The treatment was well borne. The results are reported to be favourable with a considerable degree of healing of the ulcers.

L. R.

DAVISON (A. R.). **Leprosy Treatment with Grasset's Tubercle Endotoxoid. Interim Report.**—*Leprosy Review.* 1941. Jan. Vol. 12. No. 1. pp. 18–24.

On the supposition that there may be a group antigen for the organisms of leprosy and tuberculosis, the author tried the effect

of Grasset's tubercle endotoxoid [see *Bulletin of Hygiene*, 1939, Vol. 14, p. 861] in 11 cases of leprosy. He concludes that the improvement obtained in all the neural cases of tuberculoid type indicated some beneficial result from the treatment. *L. R.*

COLLIER (D. R.). **The Use of Diathermy in Leprosy. A Preliminary Report.**—*Thai Sci. Bull.* 1940. Vol. 2. pp. 109–116. [Summary taken from *Internat. Jl. Leprosy*. Manila. 1940. Oct.–Dec. Vol. 8. No. 4. pp. 538–539. Initialled H. W. W.]

The writer, with Oberdoerffer, who at that time was associated with him [at the Chiengmai leprosarium in Thailand (Siam)], on the basis of the latter's theory that the essential predisposing factor in leprosy is " adrenocortical insufficiency, enhanced by adreno-toxic sapotoxins from food plants," employed adrenal stimulation in the treatment of cases. This was effected by means of diathermy, one electrode being placed over the upper kidney region and the other over the lower ribs anteriorly. Treatments were given for fifteen minutes twice a week to 33 patients who had been under routine chaulmoogra treatment for at least a year, most of whom had made no progress in the preceding half year. At the end of six months there was definite improvement, it is stated. Most of the patients were improved generally and had gained weight, and none showed any activity of the skin lesions ; in six cases enlarged ulnar nerves had returned to normal size. At the beginning 18 had positive nasal smears, at the end only 2 ; positive skin smear findings, however, had decreased only from 23 cases to 20. The most striking results were seen in the marked reduction of frequency of lepra reaction. In the previous six months 21 of these cases had had one or more reactions ; in the treatment period only 9 had such disturbances and they were of diminished severity. Twelve patients who in the preceding period had had from 5 to 16 reactions each had none at all, and only one patient had more than one.

AMERATUNGA (G.). **Treatment of Leprosy.**—*Jl. Ceylon Branch Brit. Med. Assoc.* 1940. Sept. Vol. 37. No. 3. pp. 192–201.

WEAVER (Eunice). **Importance of the Preventorium in the Rehabilitation of the Child of the Leper.**—*Internat. Jl. Leprosy*. Manila. 1940. Oct.–Dec. Vol. 8. No. 4. pp. 495–500.

This paper deals with the history of the separation of young children from their leper parents in order to prevent them contracting the disease, and it stresses the importance of this measure. It presents nothing new. *L. R.*

HELMINTHIASIS.

Précis of Abstracts in this Section.

Cestodes.—BONNE and LIE KIAN JOE (p. 469) describe a case of sparganosis of the intestinal wall in a man in Java. MUELLER (p. 469) reports that Charcot-Leyden crystals, scattered among the cellular elements, have been found in the lesions of sparganosis in man and monkey.

BONNE (p. 470) gives a short account of the tapeworms which may be found in the East Indies.

BLYTH (p. 470) reports a case of epilepsy due to cysticercosis in a soldier, and gives details of the symptoms.

BARNETT (p. 471) states that in New Zealand about 120 fresh cases of hydatid disease are seen every year in man. Half the sheep and cattle have hydatids and one third of the country dogs harbour the adult worm; the incidence does not appear to be growing less. A review of the world incidence of human disease is given. ROBB (p. 471) describes a case of pulmonary hydatid disease; the patient died of haemorrhage after successfully evacuating the cyst *via* the bronchi. DÉVÉ (p. 471) describes a case of hydatid cysts in the pectoral muscles. One cyst was of the ordinary type, the other of the alveolar type. WELCKER *et al.* (p. 472) describe a case of hydatid disease of the uterus. ARCE (p. 472) emphasizes certain points in the surgery of hydatid disease.

BONNE (p. 473) records a further case of infection with *Bertiella studeri* in Java.

WOODRUFF (p. 473) reports a case of infection with *Dipylidium caninum* in Australia.

Nematodes: *Ankylostomiasis*.—OTTO *et al.* (p. 473) consider a zinc sulphate solution of specific gravity 1180 to be efficient in concentrating protozoal cysts and hookworm eggs, but agree with LANE's view that the straining of faecal suspensions results in loss of eggs.

KELLER *et al.* (p. 474) show that in six southern United States the incidence of hookworm infection, as shown by the techniques used, fell from 36·6 per cent. in 1910–1914 to 11·2 per cent. in 1930–1938. The areas of highest incidence are confined to the coastal plain and the places in which the soil is sandy; the age of greatest incidence is 5 to 19 years. The individual worm burden tends to increase as the number of infested persons in the family increases. Infection in whites is four times as frequent as in negroes. In comment LANE points out that the technique used could not have disclosed all infections. OHAMA (p. 474) gives the results of an investigation on hookworm infection in children on the island of Isigaki. The infection rate was 92·3 per cent. in males and 94·2 per cent. in females. WINKLER (p. 475) reports on the worm infections found in persons of foreign nationality working in German mines; the hookworm infection rate was 1·48 per cent.

BONNE and LIE KIAN JOE (p. 475) report 4 cases in which *Ancylostoma duodenale* was found in haemorrhagic patches in the wall of the intestine.

CORT and OTTO (p. 476) discuss immunity in hookworm disease, concluding that a specific immunity resulting from repeated reinfections is possible, though there is no evidence that it becomes absolute. The factors of age, diet and anaemia play a part. The immunity is general, not local, and the constant presence of worms is necessary for its maintenance. Severe clinical hookworm disease in man is probably the result of the presence of worms in a host so undernourished or debilitated that the immunity factor is not wholly effective; there may also be exhaustion of the haematopoietic system.

BROWN and OTTO (p. 476) have investigated the possibility of children being predisposed to malaria through hookworm infection, since the latter leads to reticulocytosis and it is known that *Plasmodium*

vivax is far more frequently found in reticulocytes than in mature red cells. They found no evidence in favour of direct predisposition in this way, but consider that indirectly, by debilitation, both infections, even if they do not produce marked anaemia, may predispose to other diseases.

Aguiar (p. 477) reports a case of hookworm disease complicated by casts and blood cells in the urine which also contained refractile fatty bodies. The condition improved on treatment with oil of chenopodium.

Payne and Payne (p. 477) have found, by comparative tests, that the best results in the treatment of hookworm anaemia are given by anthelmintic treatment supplemented by a small amount of iron. Anthelmintic treatment alone produced a much slower rise in haemoglobin, and the administration of iron alone was only temporarily effective in that respect; the haemoglobin values fell again if the worms were not removed. *C. W.*

Bonne (C.) & Lie Kian Joe. Darmwandhelminthiasis tewèeg gebracht door spargana. [**Sparganosis of the Intestinal Wall.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1940. Nov. 26. Vol. 80. No. 48. pp. 2788–2792. English summary.

"Two spargana, each about 2 centimeters long, were discovered in nodules in the wall of the jejunum at the autopsy of an insane Javanese man, who died from tuberculosis.

"They were fed to a young kitten, which began to show Diphyllobothrium eggs in its stools 27 days after the infection. It was killed after 42 days. Two specimens of Diphyllobothrium subgenus Spirometra were found in the intestine. Length 110 and 84 centimeters respectively.

"A previous case of human sparganosis in the Netherland East-Indies was described in 1930, also in an insane individual. A very big sparganum (length many decimeters) was discovered in the pulmonary artery of this patient."

[See this *Bulletin*, 1931, Vol. 28, p. 678].

Mueller (Justus F.). **The Occurrence of Charcot-Leyden Crystals in the Lesions of Sparganosis.** [Paper read at 16th Ann. Meeting of American Society of Parasitologists. Abstract taken from *Supp. to Jl. Parasitology.* 1940. Dec. Vol. 26. No. 6. p. 23.]

"Charcot-Leyden crystals have been reported by various authors as present in the stools in about 20 per cent. of infections with *Endamoeba histolytica*, less commonly in certain types of intestinal helminthiasis, in the sputum in cases of paragonimiasis and bronchial asthma, and in the bone marrow in chronic leukemia. Typical whetstone-shaped crystals, resembling Charcot-Leyden crystals, have now been found in the lesions of sparganosis in man and monkey, being most commonly found scattered among the cellular elements, particularly the macrophages, forming the inner lining of the cysts and galleries, or at times free in the space surrounding the worms. These crystals vary in length from 20 to 90 microns, and occur most abundantly after the infection has reached a chronic state and the worms have become well walled-off. The crystals have not been found in the tissues of infected mice nor in fishes infected with the encapsulated

plerocercoids of a species of *Diphyllobothrium* maturing in gulls. Charcot-Leyden crystals are commonly described as octahedral in form, but the present crystals, although unquestionably of the same nature as those found in amoebic dysentery, etc., are more correctly designated as hexagonal pyramids of the first order."

BONNE (C.). De Lintwormen van den mensch in Indië. [**The Tapeworms of Man in the East Indies.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1940. Oct. 1. Vol. 80. No. 40. pp. 2376–2384. With 12 figs.

There are seven tapeworms which have been found in the Indies or which, it may be expected, will be found. These are : *Taenia saginata, Taenia solium, Dipylidium caninum, Hymenolepis diminuta* and *H. nana, Raillietina madagascarensis* and *Bertiella studeri*. The author is anxious to receive any examples of these or other possible tapeworms and he gives a short description of them. *Taenia saginata* is the beef tapeworm with intermediate host the ox, in which animal is found the cysticercus stage. *Taenia solium* has its cysticercus stage in the pig, but human cysticercosis can take place by transmission of eggs from man to man. This apparently is the only tapeworm dangerous to life and not only because of the possibility of case to case infection and development of cysticerci but because of the tendency of the cysticercus stage to occur in the brain. *Dipylidium caninum* infests dogs, cats and beasts of prey and its eggs are taken up by fly larvae, which as flies may be swallowed by dogs or cats. Infection in man is due to very intimate contact with these animals and occurs especially in children. *Hymenolepis diminuta* is a universal parasite of the rat and the mouse, and all sorts of insects—beetles, cockroaches, etc.—act as intermediate hosts. The allied species *H. nana* is a much smaller worm. *Raillietina madagascarensis* has been found in Chinese children but the intermediate host is not known. *Bertiella studeri* is a monkey tapeworm and mites serve as intermediate hosts. It also has been found in a Chinese child.

W. F. Harvey.

BLYTH (William). **Cysticercosis Epilepsy.**—*Brit. Med. Jl.* 1941. Mar. 15. pp. 401–402.

The man concerned served in the Army in India from 1927 to 1933 and then passed into the Reserve. He had thereafter an attack of "nightmare," his room mate telling him that he had been throwing his arms and legs about, after another he was found lying on the floor, after a third he had mental confusion without loss of consciousness. Recalled to the Army he was sent to France and on one occasion felt a choking sensation while bending over his haversack, and lost consciousness, but, so his companions told him, neither twitched nor went pale. In September 1940, on guard duty, he felt choking coming on, left his post to sit down and woke to find himself in the guard room having, he was informed, threatened his officer. His plea of loss of memory sent him to hospital, where he showed no symptoms. His history suggested epilepsy, but a pitressin test being negative cysticercus infection was considered and X-rays showed widespread evidence of this, the opacities being of uniform density.

Clayton Lane.

BARNETT (Louis). **The Incidence of Hydatid Disease in New Zealand and Elsewhere.**—*New Zealand Med. Jl.* 1940. Dec. Vol. 39. No. 214. pp. 330–338. With 1 map. [26 refs.]

An annual survey of hydatid disease.

In New Zealand about 120 persons with fresh infections come for treatment every year and about 16 of them die. Half the sheep and cattle have hydatids and a third or more of country dogs harbour the adult, and, in spite of an intensive campaign, there is no evidence that it is lessening. The disproportionately heavy infection in South Island comes from the heavy incidence in the Canterbury District. The numbers of cases reported in various countries are: in Uruguay over 400, Argentina over 300, Australia over 200, New Zealand over 100. There are over 50 in each of these areas: Syria and the Near East, Greece, Yugoslavia (Dalmatia), Italy (Sardinia), Germany (Mecklenburg, Pomerania), Russia (Crimea, Caucasus, Siberia), Spain, Portugal, Switzerland, North Africa (Algeria, Tunis), South Africa, Balkan States; over 30 in each of Iceland, Holland (Friesland), France, Cyprus, Great Britain; over 10 in Scandinavia and the Baltic States, India, China, U.S.A., Canada. A stippled map makes this clear. The alveolar form is almost limited to Bavaria, Tyrol, Wurtemberg, Switzerland, Moscow, Kasan, Irkutsk and Tomsk. *C. L.*

ROBB (Douglas). **Hydatid Cyst of the Lung with Extraordinary Complications.**—*Australia & New Zealand Jl. Surgery.* 1940. Oct. Vol. 10. No. 2. pp. 191–194. With 3 figs.

The patient died of haemorrhage from the residual cavity of a hydatid cyst of the lung, after successfully evacuating the whole of its fluid and membrane *via* the bronchi. There was communication between the cavity in the lung and the stomach. *C. W.*

DREOSTI (A. O.). **Two Interesting Cases. Hydatid Cyst of the Lung treated by Lobectomy.**—*South African Med. Jl.* 1941. Feb. 22. Vol. 15. No. 4. p. 71.

DÉVÉ (F.). Échinococcose hydatique et échinococcose alvéolaire. Coexistence des deux lésions dans le système musculaire observée chez un normand. [**Hydatid Disease and *Echinococcus alveolaris* Coexisting in the Muscles of the Same Person.**]—*Bol. Inst. Clín. Quirúrg.* Buenos Aires. 1940. June–July. Vol. 16. No. 134. pp. 221–242. With 10 figs. [22 refs.]

A man of Normandy, aged 48, had a hydatid cyst in each pectoralis major, an ordinary one in the right, an alveolar one in the left.

Except for being sent to Salonika during the last war he had never left home. He had not associated with butchers, pork butchers, shepherds or dogs, and there had been no housedog since he was a child. His curious history was that while carrying on his right shoulder a weight of 80 kgm., and without any blow or sharp movement a sudden painful swelling appeared above the right nipple. With it there was no urticaria and no local ecchymosis, but a weakness in the right arm. In ten days this had passed off, the swelling had greatly lessened, and it was supposed that he had ruptured muscle fibres. Later the finger-like, horizontal, residual swelling grew to the size of a lemon. The diagnosis was lipoma, but operation revealed a

sterile hydatid cyst in the substance of the right pectoral stretching out towards its attachment to the humerus but not affecting the bone. Its removal needed considerable dissection, but revealed the wall as the adventitia of a hydatid cyst enclosing many daughter cysts, some living, some collapsed, but no mother cyst membrane. When the stitches were taken out the other cyst was found at the attachment of the left pectoralis major to the sternum. After being dissected out serial sections showed it to be an alveolar hydatid measuring 1·9 cm. in its longest diameter, with round it giant cells and a cellular palisade set in fibrous tissue. The excellent illustrations are ample evidence for the conclusions. *C. L.*

McNally (Andrew) & Case (James B.). **Echinococcus Cyst of Muscle. Report of a Case occurring in the Left Psoas Muscle.**—*Amer. Jl. Surgery.* 1941. Feb. Vol. 51. No. 2. pp. 419–422. With 2 figs.

Welcker (Merrill L.), Kaneb (George D.) & Goodale (Raymond H.). **Primary Echinococcal Cyst of the Uterus.**—*New England Jl. of Med.* 1940. Oct. 10. Vol. 223. No. 15. pp. 574–576. With 3 figs.

This is held to be the 43rd reported case of primary hydatid disease of the uterus and the first from North America.

A woman of 77 came to hospital for retention of urine and lower abdominal pain of 3 days' standing. She died before her condition allowed of operation and the autopsy result is reported. The uterus, 14 cm. across, filled the pelvis ; in its posterolateral wall lay a hydatid 13 cm. across and consisting of mother cyst, about 100 daughter cysts and free scolices. No other hydatids were found in any other organ. The ureters and the pelves of both kidneys contained pus. *C. L.*

Arce (Jose). **Hydatid Disease (Hydatidosis). Pathology and Treatment.**—*Arch. Surgery.* 1941. Jan. Vol. 42. No. 1. pp. 1–17. With 3 figs.

"The aim of the paper is to offer physicians in the United States a brief summary of the actual knowledge of this disease, its pathologic features, its diagnosis and its treatment."

This knowledge it has been the business of this *Bulletin* to give. Arce's surgical experience brings out these points—there must be complete protection of the operating field by towels to prevent hydatid seeding of the abdomen, complete evacuation of the parasite, destruction of any scolices that remain by running in ether or 2 per cent. formol (that is 2 per cent. of 40 per cent. formaldehyde solution) and closure of the adventitial cyst and of the skin without drainage (Posadas's method). Alternatively there may be removal of the cyst and its adventitia complete if the cyst is small and particularly if it is in the omentum or peritoneum. Lastly there is what he calls "hydatid birth" by which is meant exposure of the adventitia, its incision without injury to the parasite, which delivers itself whole, the pouch being sutured and the operative wound closed without drainage. He puts the percentage distribution of cysts as :— liver 70, lungs 15, muscles 4, spleen 3, bone, connective tissue, brain and kidney each 2.

C. L.

BONNE (C.). Over *Bertiella studeri* (Blanchard 1891). *Bertiella satyri* Stiles & Hassall 1926. *Bertia satyri* Blanchard 1891.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1940. Sept. 17. Vol. 80. No. 38. pp. 2222–2230. With 7 figs. on 1 plate. [17 refs.] English summary.

" Previously observed cases of Bertiella studeri infection in men are shortly described. A new case in a 7 year old Chinese girl in Java is added. The internal anatomy of the worm passed by this girl is compared with the internal structures of Bertiellas in Java monkeys (Macacus cynomolgus). No important structural differences were observed. The head of the worm, causing the human infection, was not available. Special suggestions regarding the modus of infection do not arise from this case. The plate gives illustrations of anatomical details of the worms in men and in monkeys."

WOODRUFF (Harold A.). **Uncommon Tapeworm in a Child** (*Dipylidium caninum*). [Correspondence.]—*Med. Jl. Australia.* 1940. Dec. 21. 27th Year. Vol. 2. No. 25. p. 682.

A report from the University of Melbourne. A child of 17 months passed a segment in a stool. Male fern brought away a complete *D. caninum.* *C. L.*

IWATA (Seishun). **The Classification List of Cestoidea in Japan.**—Reprinted from *Volumen Jubilare Pro Prof. Sadao Yoshida.* Osaka, Japan. 1939. Mar. Vol. 2. in *Collected Papers from the Faculty of Medicine, Osaka Imperial University.* 1939. pp. 29–51. [76 refs.]

OTTO (G. F.), HEWITT (Redginal) & STRAHAN (Dorothy E.). **A Simplified Zinc Sulfate Levitation Method of Fecal Examination for Protozoan Cysts and Hookworm Eggs.**—*Amer. Jl. Hyg.* 1941. Jan. Vol. 33. No. 1. Sect. D. pp. 32–37.

" The above results confirm earlier reports (Faust *et al.*, 1938 and 1939) that zinc sulfate solution at a specific gravity of 1·18 is very effective in concentrating protozoan cysts and is essentially as good as saturated sodium chloride solution (sp. grav. 1·2) in concentrating hookworm eggs. However, these results clearly suggest that straining fecal material through cheesecloth, as described by Faust and his co-workers, has no great merit and actually reduces the efficiency of the zinc sulfate levitation method. This is in accord with Lane's (1940) objection to screening.

" In an attempt to simplify the procedure we utilized zinc sulfate solution in a simple levitation technic essentially as described by Willis (1921) without straining, washing, or centrifugation. This simplified technic appears to be just as efficient as the original zinc sulfate levitation method for concentrating hookworm eggs and nearly as efficient as the latter method in concentrating protozoan cysts. It seems altogether probable that the greatest efficiency with this solution would be obtained by using it in an apparatus similar to that described by Lane (1924) in which a coverglass is held against the mouth of a tube while it is being centrifuged. Since we were searching for a technic which would not require any appreciable amount of apparatus this suggestion was not experimentally tested."

C. L.

KELLER (Alvin E.), LEATHERS (W. S.) & DENSEN (Paul M.). **The Results of Recent Studies of Hookworm in Eight Southern States.**—*Amer. Jl. Trop. Med.* 1940. July. Vol. 20. No. 4. pp. 493–509. With 2 figs. [16 refs.]

These surveys were by the small drop dilution method of Stoll and Hausheer, the earlier ones with which they are compared were by faecal smears.

"1. Hookworm surveys in eight southern states were made during the periods 1910–1914 and 1930–1938. In the early period, 577,590 specimens of feces were examined, and in the later period, 424,511. The numbers found positive in the early and later periods were 240,895 and 81,913 respectively.

"2. After adjustment for the distribution of the population the percentage found positive in six of the eight states was 36·6 per cent. in the earlier period and 11·2 per cent. in the later period, resulting in a reduction of 68·3 per cent.

"3. In the later study the states in the order of prevalence from highest to lowest were as follows: Mississippi, South Carolina, Alabama, North Carolina, Kentucky and Tennessee.

"4. While there is a widespread distribution of hookworm, the areas of highest incidence are confined to the coastal plain and sandy soil areas of each state.

"5. The age distribution shows that the greatest prevalence was in the group 5 to 19 years of age. The peak of incidence, 24·5 per cent., was reached in the age period 15 to 19. In preschool children and adults the incidence was about one-half as great as that found in the school age group.

"6. The distribution of all positive cases shows that about one-fourth of the individuals had moderate, heavy or very heavy worm infestations sufficiently severe to produce clinical symptoms. The remainder of the cases were classified as very light or light infestations.

"7. The data analyzed with reference to household groups seemed to indicate that the individual worm burden tended to increase as the number of infested persons in the family increased.

"8. A comparison was made of hookworm in 17,458 negroes and 59,028 white persons in the same counties during 1930–1938. The incidence in negroes was about one-fourth that in white individuals and the average intensity of infestation was about one-half that found in white persons."

[In the method of Stoll and Hausheer 1/200 gramme of faeces is used. Using D.C.F.F. I have never obtained from a faecal specimen consistent counts of less than about 30 eggs per gramme, presumably then the result of a single female hookworm, I suggest a Necator. Accordingly 7 to 10 examinations by the Stoll-Hausheer method are needed to display the presence of a female hookworm, and even then will do so with certainty only if eggs are evenly distributed in the faecal mass; it does not disclose all present infections.] *C. L.*

OHAMA (Sinken). **Observations on the Disease of Hookworm in Isigaki Island, Okinawa Prefecture. I. On its Incidence and Degree of Infestation among Children of the Kabira Primary School.**—*Taiwan Igakkai Zassi* (*Jl. Med. Assoc. Formosa*). 1940. Oct. Vol. 39. No. 10. [In Japanese pp. 1557–1567. [25 refs.] English summary p. 1567.]

"The author investigated both the incidence and the degree of hookworm infection among 91 children (39 males, 52 females) of the

Kabira primary school, Isigaki Island, Okinawa Prefecture, by means of Wakeshima's egg-counting method. The results are summarized as follows :—

" 1. The infection rate of hookworm among children of the Kabira primary school was 93·4 per cent. (92·3 per cent. for males and 94·2 per cent. for females).

" 2. The observation of age groups with regard to the incidence of hookworm disease indicated that the infection rate was 100 per cent. in 10, 11 and 16 years of age, and 85·7 per cent. in 12 years of age (the lowest of all).

" 3. The average number of eggs evacuated by a child was 256,345 per day. The number of eggs evacuated according to sex was 170,148 for the males, and 320,994 for the females, *i.e.* the number for female children was, roughly, twice as many as that for male.

" 4. The degree of infection of hookworm among the children of Kabira primary school was as follows : Very light cases 42·86 per cent., light cases 36·48 per cent., moderate cases 14·29 per cent., severe cases 0 per cent. and very severe cases 0 per cent."

WINKLER (Annelise). Ueber die Verbreitung von Ankylostoma duodenale bei Grubenarbeitern. [**Incidence of** *A. duodenale* **in Miners.**]—*Klin. Woch.* 1940. Mar. 16. Vol. 19. No. 11. pp. 252–254. [11 refs.]

There have been examined, essentially by Fülleborn's gravity floatation method using a saturated solution of common salts, the stools of 149 Italians and 1,463 persons from south-east Europe, working in German mines.

The discovered percentages of infection for the two groups were : hookworms 2·68 and 1·3, Ascaris 6·71 and 4·58, Trichuris 24·16 and 5·19, Enterobius 1·34 and 0·48. As controls 550 persons were examined, 310 from hospitals and nursing homes and 240 from elsewhere, the respective percentages of discovered infections being : hookworms 0·32 and 0, Ascaris 3·87 and 2·92, Trichuris 1·29 and 0·42, Enterobius 0·97 and 1·25. It is pointed out that the percentage of hookworm infections in German miners in 1903 was 13, in 1912 was 0·18 and now has risen to 1·48 [but the Hamburg method was not published till 1926 (HUNG, this *Bulletin*, 1927, Vol. 24, p. 195), and on the influence of an egg concentration method in increasing discovered infections Winkler makes no comment]. *C. L.*

BONNE (C.) & LIE KIAN JOE. Over darmwandhelminthiasis [**Helminthiasis of the Intestinal Wall.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1940. Nov. 26. Vol. 80. No. 48. pp. 2782–2788. [Refs. in footnotes.] English summary.

" Description of 4 new cases of helminthiasis of the intestinal wall, a condition previously described by the senior author [this *Bulletin*, 1938, Vol. 35, p. 277]. In three of these cases a single specimen of Ancylostoma duodenale was found on dissection of the hemorrhagic patches in the intestinal wall. In the fourth case 5 specimens of A. duodenale were discovered, one of them in a fresh hemorrhage in the wall of the colon, the other four in hemorrhages in the wall of the small intestine.

" Ancylostoma duodenale was also present in the intestinal contents ; their number was small in comparison with the number of Necator americanus present at the same time. For the first time helminthiasis of the intestinal wall was discovered in a Chinaman."

[Knowledge of the condition dates back to GRASSI (1879). WHIPPLE reported it in Panama in 1909. Looss in 1905 found a fairly adult worm half in a cavity in the intestinal wall and half hanging into the lumen of the gut. The valuable report on these new cases suggests that the condition will be found oftener if looked for.] *C. L.*

CORT (W. W.) & OTTO (G. F.). **Immunity in Hookworm Disease.**—*Rev. of Gastroenterology.* 1940. Jan.–Feb. Vol. 7. No. 1. pp. 2–11. [19 refs.] Discussion pp. 11–14.

A discussion on work, by the authors and others, bearing on this matter and already abstracted in this *Bulletin* [1932, Vol. 29, p. 762; 1933, Vol. 30, pp. 219, 221; 1935, Vol. 32, p. 641; 1939, Vol. 36, p. 833].

It is difficult to explain many results of experimental infections of dogs with *Ancylostoma caninum* otherwise than by development of specific immunity resulting from repeated infections; but though this immunity may be highly protective there is no evidence that it becomes absolute and it is subject at least to the complicating factors of age, diet and anaemia. Age resistance is believed to lie in the ability of mature dogs to acquire a specific immunity more quickly than young animals can. In dogs seriously debilitated by defective diet or anaemia the mechanism that produces and maintains specific immunity cannot respond effectively to invading worms. This immunity is general, and not local, is caused by specific antibodies, and the continuous presence of worms in intestine or tissues is needed to keep it up.

In man, too, there is evidence that host reactions are important in regulating hookworm infections.

"We suggest, therefore, the hypothesis that severe clinical hookworm disease as it occurs in human populations is rarely an uncomplicated effect of the presence of hookworms, but is commonly due to the presence of hookworms in hosts so undernourished or otherwise debilitated that the immunity factor is not wholly effective. There may also be in certain cases an exhaustion of the hematopoietic system or the development of 'idiopathic' anemias under a complicated set of conditions in which the presence of hookworms is only one factor."

C. L.

BROWN (H. W.) & OTTO (G. F.). **Hemoglobin and Reticulocyte Studies on Hookworm and Malaria Infected Children.**—*Amer. Jl. Hyg.* 1941. Jan. Vol. 33. No. 1. Sect. D. pp. 22–31. [38 refs.]

The studies were made on 673 white school-children in North Carolina and the authors had in mind the finding by HEGNER [this *Bulletin*, 1939, Vol. 36, p. 495] that *Plasmodium vivax* was found in reticulocytes 1,292 times more often than in mature red cells, thus raising the question whether hookworm infection predisposes to malaria seeing that when acute in dogs it has raised the reticulocyte percentage as high as 40.

First it was necessary to show whether hookworm infection was present. For this purpose D.C.F. using a saturated solution of common salt was compared with the egg-counting technique of STOLL. In 573 faecal specimens large enough for both techniques to be used, D.C.F. disclosed infections in 32 per cent., Stoll's technique in 17 and in no case positive to the latter did the former fail to display eggs. (Moreover Stoll's method displayed no infection other than that of

hookworms, while D.C.F. disclosed Enterobius five times, *H. nana* twice, *H. diminuta* once, Taenia once, free living nematodes five times.) It may be assumed, it was added, that Stoll's method missed about half of these light hookworm infections, and, since it was used in all recent surveys, the figures reported from these surveys are correspondingly incorrect. But though the average intensity of infection was light here there were local pockets where it was heavy in family and community. In all groups of children the haemoglobin level lay between 12 gm. in 100 cc. of blood among those who had both hookworm and malaria, and 12·7 among those who had neither, but there was an average difference of 0·1 gm. between the latter and 71 who had hookworm infection only. Further, the reticulocyte percentage was 0·8 in 444 in whom neither infection was present and was 1·2 in eight who had both.

"It seems to us that many of these school children are perhaps on the threshold of anemia. . . . While there is no evidence of a predisposition to malaria as a result of 'hookworm reticulocytosis' the infection cannot be regarded as wholly benign. Hookworms may well be, even in light infections, a contributing factor in the illness of such patients while not present in sufficient numbers to be alone the cause of anemia. Hookworms or malaria, or both, by partial debilitation may predispose to other infections even though neither is sufficient to produce a marked anemia. Thus, any one of the contributing factors in this threshold condition may, with little change, appear to be the cause of subsequent illness."

[It seems to have escaped attention that where a specimen is large enough to allow of D.C.F. but not of Stoll's method as well, the mere adding of more salt solution and spinning three more times, using, that is, D.C.F.F., gives ready and accurate counts.] *C. L.*

Aguiar (José Adonias). Nephrose lipoidica ankylostomosica. [**Lipoid Nephrosis from Hookworms.**]—*Brasil-Medico.* 1940. Mar. 2. Vol. 54. No. 9. pp. 129–135.

A youth of Bahia, Brazil, aged 20, had in the urine refractile fatty bodies, hyaline and granular casts and some red and white corpuscles, the fluid having a faecal smell; the blood on one occasion was positive for malaria parasites [haematozoario de Laveran]; in the faeces were eggs of Ascaris, Trichuris and "Ankylostoma duodenale," the last in large numbers; there were signs of ascites and pleural effusion, and puffiness of face, penis and scrotum. He improved with oil of chenopodium, the hookworm eggs becoming few but no search of the faeces had apparently been made to determine the hookworm species actually concerned. There is no further mention of the other intestinal worms, or of the possibility that this generous host of parasitic species, among them the Old World hookworm, may not also have been exhibiting the chyluria caused by *W. bancrofti*. *C. L.*

Payne (George C.) & Payne (Florence King). **Relative Effectiveness of Iron and Anthelmintics in the Treatment of Hookworm Anemia.** —*Amer. Jl. Hyg.* 1940. Nov. Vol. 32. No. 3. Sect. D. pp. 125–132.

This sustained controlled work should, though it is probably optimistic to hope that it will, be accepted as showing that effective treatment of hookworm anaemia must have two parts—unworming and replacement of lost iron.

The study was made on children who showed more than 4,500 hookworm eggs to the cc. and were anaemic as measured in the laboratory by the photoelectrometer of Sandford and Sheard. It was first shown that the value of the last method was not lessened by the delay in examination involved in sending the specimen to the laboratory. If malaria, syphilis, schistosomiasis or tuberculosis were suspected, the data were not used. Ordinarily anthelmintic treatment was by a mixture, in capsules, of carbon tetrachloride and oil of chenopodium in the proportion of two to one; if these could not be swallowed or if there were heavy Ascaris infection the treatment was limited to the oil; a purgative followed; treatment did not aim at complete unworming, but at least a lessening which could be brought about without disorganizing school work. For giving iron Blaud's pill was found more suitable than ferric ammonium citrate. The authors' conclusions are as follows:

"1. The work of Rhoads and his associates (1934) on the treatment of the anemia associated with hookworm infestation was supplemented by additional studies under field conditions and extending over a longer period.

"2. Tests of the effect of treatment with iron alone, with anthelmintic alone, and with iron and anthelmintic were made separately on groups of anemic and hookworm infested rural school children in Puerto Rico.

"3. Administration of iron was followed by a rapid and striking increase in hemoglobin. If the parasites were not removed there was a definite fall in the hemoglobin level within 5 months.

"4. Following anthelmintic treatment there was a slow rise in hemoglobin values and a satisfactory level was reached in from 1 year to 2 years.

"5. Anthelmintic treatment supplemented by a small amount of iron gave the most satisfactory results in the maintenance of the hemoglobin level."

C. L.

RELAPSING FEVER, RAT-BITE FEVER, LEPTOSPIROSIS.

Précis of Abstracts in this Section.

Morrison and Parsons (p. 479) report that relapsing fever is not uncommon in California and Nevada, and that the infection is frequently contracted at Lake Tahoe. They record three cases in one family, one in a child aged six days, but cannot account for the outbreak, since neither rodents nor Ornithodorus were found in the house. Hemingway *et al.* (p. 479) record relapsing fever from central Oregon.

Row *et al.* (p. 479) recovered *S. minus* by inoculation of deposit from centrifuged human blood into a mouse.

Snapper *et al.* (p. 480) report leptospirosis in two persons engaged in work which necessitated the handling of dogs' urine in Peiping. Five of 52 dogs examined showed agglutinins, and the same was true of several *Rattus norvegicus* trapped in the city.

deMonte and Gupta (p. 480) used bacteriophage to purify a culture of *L. icterohaemorrhagiae* contaminated with *S. typhi murium*.

Kwee Tat Tjhong (p. 481) has studied the distribution of leptospirae in the kidneys of infected animals acting as chronic carriers.

C. W.

Morrison (Sydney K.) & Parsons (Lawrence). **Relapsing Fever: Report of Three Cases, One in a Six Day Old Infant.**—*Jl. Amer. Med. Assoc.* 1941. Jan. 18. Vol. 116. No. 3. pp. 220–221.

A report of three cases of relapsing fever, one in a six-day-old infant, occurring in the members of a family living in Reno, Nevada. The authors mention that since 1933, each year they have seen about half a dozen patients with relapsing fever, nearly all having acquired the infection at Lake Tahoe. Two medical practitioners in Sacramento, California, are stated each to have seen as many cases, also originating mostly at Tahoe, so that the disease would seem to be not rare in California and Nevada.

The above 3 cases, however, occurred in a family that had not visited Tahoe during the year and the source of infection was not ascertained. No rodents nor Ornithodorus were found in the house where the cases occurred although other species of ticks were present. The newborn infant, which showed large numbers of spirochaetes in its blood six days after birth, may have been infected *in utero* through the placenta, or the spirochaetes may have entered during its transit in the birth canal. All three cases were cured by injections of neoarsphenamine.

It is recommended that in this region relapsing fever should be suspected in persons taken suddenly ill for no obvious cause, and suffering from chills, fever, headache, and with a normal leucocyte count. Mild leucocytosis is said to be uncommon. *E. Hindle.*

Hemingway (Max W.), Hemingway (Robert W.) & Arneson (Valborg K.). **Relapsing Fever.**—*Northwest Med.* 1940. Oct. Vol. 39. No. 10. pp. 362–364. With 3 figs.

The description of a case of relapsing fever in central Oregon. The symptoms were typical and spirochaetes were found in the blood after the third febrile attack. The patient was treated successfully by intravenous injections of 0·1 gm. novarsphenamine on two successive days.

There was no indication of the source of infection. *E. H.*

Row (R.), Ambegaonker (S. D.) & Bhende (Y. M.). **Recovery of *Spirillum minus* from the Peripheral Blood of a Rat-Bite Fever Case by Experimental Inoculation into a Clean Mouse.**—*Indian Med. Gaz.* 1941. Jan. Vol. 76. No. 1. pp. 39–40.

A record of the recovery of *Spirillum minus* from the peripheral blood of a typical case of rat-bite fever in Bombay. Although the organisms were not found by direct examination of the patient, a mouse inoculated intraperitoneally with the centrifuged deposit from 1 cc. of his blood, showed a heavy infection with *S. minus* 12 days later. *E. H.*

Loos (D.). Unfall und Ikterus infect. Weil. [**An Accident and Infection with Weil's Disease.**]—*Med. Welt.* 1940. Feb. 24. Vol. 14. No. 8. p. 195.

The record of a typical case of Weil's disease in a Breslau butcher, which developed 7 days after the patient had received a cut in the slaughterhouse. *E. H.*

Snapper (Isidore), Chung (Huei-Lan), Chu (Irving) & Chen (Kuo-Ch'ing). **Preliminary Observations on Human, Canine and Murine Leptospirosis in North China.**—*Chinese Med. Jl.* 1940. Oct. Vol. 58. No. 4. pp. 408–426. [12 refs.]

An account of preliminary observations on the prevalence of leptospirosis in China, which hitherto has only been reported from Canton, by T'ang. [See this *Bulletin*, 1937, Vol. 34, p. 707.]

The authors give details of two cases of *L. canicola* infection. Both patients were members of the department of physiology at the Peiping Union Medical College, and for some months had been engaged in work necessitating the handling of dogs' urine. Although leptospirae were not found, the blood of both cases agglutinated the Roesel strain of *L. canicola* and the Sumatra strain of *L. hebdomadis* B, in high dilution, but not other strains. The agglutination of *L. hebdomadis* is probably a para-specific reaction often occurring with this strain. Also the sera of three of the dogs, to whose urine the patients had been exposed, agglutinated *L. canicola* but not other strains.

Five out of 52 dogs examined in Peiping showed evidence of infection, the agglutination titres being respectively 1 : 10,000 in the 2 human and 2 canine cases, and 1 : 100, 1 : 1,000 and 1 : 3,000 in the other canine cases. The sera of 5 out of 68 rats, *R. norvegicus*, trapped in Peiping, contained antileptospira agglutinins with a titre of 1 : 100 or higher. The agglutinins present belonged to three types of leptospira, *canicola* (Roesel), *hebdomadis A*, and *bataviae* (Swart). All attempts to find leptospira in 172 rats were negative. *Trypanosoma lewisi* was found in 78 out of 173 rats ; *Cysticercus fasciolaris* in 85 out of 181 ; and in 5 rats the urine and scrapings from bladder contained spirochaetes morphologically resembling *S. recurrentis*. *E. H.*

deMonte (A. J. H.) & Gupta (S. K.). **The Use of Bacteriophage for freeing Protozoal Cultures of Contaminating Bacteria. (Isolation of *Leptospira icterohaemorrhagiae* from a Mixed Infection in Guinea-Pigs.)**—*Indian Med. Gaz.* 1941. Mar. Vol. 76. No. 3. pp. 154–155.

The description of a method of purifying a strain of *Spirochaeta icterohaemorrhagiae* which had become contaminated with a *Salmonella* group of organisms.

The mixed culture was exposed to the action of a potent bacteriophage active against *S. typhi murium* (*Bact. aertrycke*) which produced complete lysis in 4 hours. The mixture was kept at room temperature for 5 hours and then inoculated into guineapigs, from which the pure strain of leptospira was recovered.

This action could not be obtained in the presence of gross organic tissue, such as that produced by grinding up infected liver and kidney

tissue, but the removal of gross matter by filtration through kieselguhr paper, or by centrifuging, resulted in the purification of the strain.

[The title of this article is somewhat misleading as no protozoal cultures are referred to, but only a strain of *Leptospira icterohaemorhagiae*.] *E. H.*

KWEE TAT TJHONG. Over de positie der leptospiren in de nier bij chronische uitscheiders. [**The Position of Leptospirae in the Kidneys of Chronic Carriers.**] [Thesis for Doctorate of Medicine, Medical School, Batavia.]—80 pp. With 6 figs. on 1 plate. [133 refs.] English summary.

"In animal carriers the leptospirae are continuously excreted with the urine. They maintain themselves by multiplication in certain parts of the renal cortex. They are not equally distributed throughout the kidneys but they inhabit, closely packed together in clusters, the lumen of contiguous convoluted tubules. These groups of infected tubules may be more or less numerous and are usually picked up with ease under the low power of the microscope.

"Serial sections reveal that these infected tubules are parts of the same nephron. Two or more neighbouring nephrons may be infected.

"This condition was studied by the author in *Rattus norvegicus*, *Rattus rattus brevicaudatus*, cats, dogs and pigs, infected in nature and in experimentally infected guineapigs and white mice, which had been made carriers by the use of less virulent strains of leptospirae. In all these animals the leptospiral clusters are found in the distal convoluted tubules only.

"During the acute period of infection the leptospirae pass from the interstitial renal tissues through the wall of the tubules into their lumen. In the proximal convolutions and in Henle's loop the strength of the current of the urinary fluid washes them down towards the distal part of the nephron. In the meantime most of the fluid in the tubules is absorbed and only a relatively weak flow continues in the distal convoluted tubules. The irregular outline of these tubules with their niches and tortuosities offers a chance for the leptospirae to settle amongst the debris often present there and to establish a more or less permanent colony.

"If human chronic leptospiral carriers occur, we may also expect the leptospirae to live in the distal convoluted tubules, which have irregularities in shape comparable to those in the animals studied."

MISCELLANEOUS.

ELLIS (A. G.). **Notes on Disease in the Far East.**—*Rocky Mountain Med. Jl.* 1941. Apr. Vol. 38. No. 4. pp. 289–292.

In this paper the author draws upon his experiences as pathologist in a hospital in Bangkok over a period of 17 years. He refers briefly to the prevalent diseases. The enteric fevers are common. Malaria is very prevalent, especially in northern Siam; in one series of

examinations *Plasmodium vivax* was found in 551, *P. falciparum* in 332, *P. malariae* in 6 cases. Of the dysenteries amoebic is more common than bacillary, though liver abscess is rare.

Beriberi is not now so widespread as it once was, probably because polished rice is not now so frequently used. Leprosy is very prevalent and he estimates the cases at between 20,000 and 50,000. There are four leprosy institutions, with a total capacity of 1,130 patients. Tuberculosis is rampant and the pulmonary form is very fatal; there is a tuberculosis hospital near Bangkok. Valvular disease of the heart is fairly frequently found and the author attributes this to rheumatism in childhood. Kala azar and undulant fever have not been identified in spite of careful search.

Trachoma and cataract are common, as are venereal diseases (especially in Bangkok) and yaws. Diphtheria appears to be increasing, pneumonia is common. There has been no true epidemic of cholera in recent years, but cases occur in some of the villages every year; the disease was probably introduced from Burma in the most recent extensive outbreak. Plague is seen occasionally. Rabies, though rare, is known, and pariah dogs are probably responsible; snake bite is a frequent occurrence, the king cobra (*Naja bungarus*) being found. Infection with *Gnathostoma spinigerum* has been reported 16 times from Siam.

Cancer, especially of the mouth, is fairly frequent, and the author considers that it may take origin from the native custom of betel-chewing. Goitre is found in some districts; of 185 cases 41 were of the exophthalmic type. Urinary calculi are often found; no suggestion as to the cause of the condition is made [but it may be remembered that in India McCarrison attributed the frequency of these calculi in part to vitamin A deficiency.] *C. W.*

REVIEWS AND NOTICES.

Cilento (Raphael) [Kt., M.D., B.S.(Adel.), D.T.M. & H.(Eng.), F.R.San.I.(Lond.), etc.] [Compiled by]. **Tropical Diseases in Australasia. A Handbook.**—pp. xii+371. With 7 line drawings. 1940. Brisbane, Queensland: W. R. Smith & Paterson Pty. Ltd., Marshall Street, Valley.

In his preface the author indicates the scope of this book; it "is not intended to be a substitute for the more complete textbooks of tropical medicine, but is a compilation from many sources, emphasizing only those matters considered important from the Australasian viewpoint." The diseases covered are those which occur in tropical Australia, Melanesia and Western Polynesia.

The order in which the diseases are taken is unusual: the first four chapters deal with diseases transmitted by insects, the fifth with leptospirosis and rat bite fever, the sixth with the diagnosis of fevers in Northern Australia, the seventh with epidemic invaders, plague,

cholera and smallpox, the eighth with less likely invaders, trypanosomiasis, leishmaniasis and relapsing fever, the ninth with the dysenteries, the tenth with the worm infestations and the remaining six chapters with nutritional disorders, leprosy, yaws, venereal diseases, skin affections and poisonous animals and plants. There are two appendices, on arthropod vectors and on rat control measures. This order results in some anomalies, for instance filariasis is separated from the other worm diseases, but in placing at the beginning the diseases of major importance the author has probably acted wisely; there appears to be no really satisfactory arrangement of tropical diseases.

Malaria and blackwater fever are described at some length, and the characters of the three common parasites are given in a table taken from *Tropical Medicine*, by ROGERS and MEGAW. The author states that the sporozoite penetrates or applies itself to one of the red blood cells of man, within which it demonstrates its further growth, but so far as the reviewer is aware, there is no certain knowledge of what happens between the entry of the sporozoite through the skin and the appearance of the first ring forms—a subject which has recently exercised the technical skill and the ingenuity of several workers and which is bound up with the question of exo-erythrocytic schizogony in bird malaria. The prevention of malaria is dealt with from the personal rather than the public health point of view, though the principal measures of anopheline control receive mention, with the reservation that the subject is so big that more comprehensive work should be consulted by those interested. In the treatment of blackwater fever blood transfusion is mentioned but does not receive the emphasis warranted by the reports of its efficacy written in recent years.

The second chapter deals with filariasis as another of the commonest insect-transmitted diseases.

Yellow fever is included in the chapter on virus diseases transmitted by insects, of which the others are dengue and sandfly fever. Emphasis is laid on measures of prevention. In discussing typhus it would have been well to make it clear that the serological diagnosis is only valid if the O strains of *Proteus X* are used. Q fever [which by now surely merits a more dignified name] is described at some length, as is fitting in a disease which Australian workers have done so much to elucidate, and the close resemblance to the rickettsial disease of Montana is referred to. Leptospirosis is given full description. In plague the encouraging work with the sulphonamides in treatment is not mentioned, nor is vaccination with living vaccines such as the E.V. strain of Madagascar or the strain used by OTTEN in the Dutch East Indies. In the treatment of amoebiasis the author follows the lines laid down by MANSON-BAHR, using E.B.I. and yatren (in enema form) simultaneously. For bacillary dysentery the classical treatment is advised, but here again recent experience indicates that sulphonamide derivatives may revolutionize present methods. The reports suggesting this are probably too recent for the author to have been able to consult before going to press, but in later editions this work will probably find a place.

In the treatment of Ascaris infections santonin is not mentioned, though it is given as the drug most commonly prescribed in Enterobiasis. Santonin does not now enjoy the reputation it once had, but in the recollection of the reviewer it is more often prescribed for Ascaris than for Enterobius. [It is possible that phenothiazine may become the drug of choice for both.]

Epidemic dropsy is included in the chapter on disorders of nutritional importance, and though mustard oil is stated to have been suspected as the cause of an epidemic in 1932 in Fiji, the recent very convincing work carried out in India, which incriminates the products of *Argemone mexicana* seed contaminating mustard oil, is not referred to.

The snakes and spiders of Australia and the lesions they produce are described in some detail, and the poisonous fish and plants of the region receive notice.

Although in this review certain omissions have been referred to, these have so largely been omissions of very recent work that it may be assumed that the reports were not available to the author before going to press, and it is in no spirit of criticism that these have been pointed out. Work in several branches of tropical medicine has proceeded apace in recent years and it is with a view to future editions that the remarks in this review have been made. The book is an admirable and concise summary of standard work on the subjects with which it deals and can be recommended with the utmost confidence to students and practitioners in Australasia, for whom it is specifically intended. It is well printed and bound. It would perhaps be improved by the inclusion of more illustrations—diagrams of the worms and protozoa described, and photographs of the more obvious lesions in the diseases mentioned, but this might entail the use of art paper throughout, and increase the cost to more than is thought advisable.

C. W.

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(1058) Wt. P15/247 1725 8/41 S.E.R Ltd. **Gp. 432.**

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